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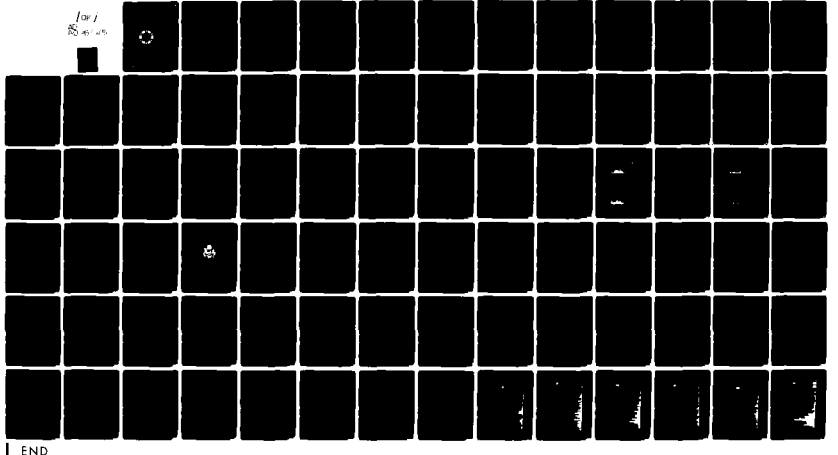

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INTERIM REPORT

OCTOBER 1, 1979 - SEPTEMBER 30, 1980

ESTABLISHING CRITERIA FOR ASSIGNING PERSONNEL TO AIR FORCE JOBS

F49620-79-C-0006

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Heavy Work	Task Demands Questionnaire

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

This report presents a comprehensive summary of the activities and accomplishments of the contractor, the Institute for Biotechnology, Texas Tech University, during the second year of the project. Working under the sponsorship of the Air Force Medical Research Laboratory with assistance from the Human Resources Laboratory, the contractor's program is directed toward improving the Air Force's present capability to select and assign personnel to Air Force Specialty Codes (AFSCs). This is being accomplished through the development of a validated objective criterion with which the Air Force can

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reliably evaluate the compatibility of an individual's ability or inability to successfully perform a selected set of well defined demanding tasks within a wide variety of Air Force career fields and jobs.

During the first year of this project, a plan was developed for surveying the task demands of the AFSCs using a two questionnaire format. These were to be complimentary survey questionnaires serving as the primary vehicle for generating the input data needed for performing an analysis of the AFSCs to quatify not only tasks requiring significant physical demands, but all physical tasks down to the least demanding. A "wave" concept was devised for administering the surveys in the field with data from a wave of the presurvey or Questionnaire 1 being used to select the tasks for the more detailed study in the strength and endurance study of Questionnaire 2. Working with a wave of 43 AFSCs starting with the most demanding as determined by the present Armed Services X-Factor Classification System, Questionnaire 1 was administered to approximately 40-50 supervisors in each career field. The ratings were analyzed by AFHRL to obtain the mean rankings for the 9-point scale.

Year 2 of this project started with the selection by Texas Tech University of tasks for use in the first wave of Questionnaire 2. At the request of AFHRL, additional modifications were made to the format of the Texas Tech University section of Questionnaire 2 developed during year 1. A review of an AFHRL pilot study of Questionnaire 2 led the TTU team to have doubts as to the usefulness of the data from this questionnaire. Therefore, plans were made to initiate base visits for the field validation before obtaining results from Questionnaire 2. An interview format was developed to obtain estimates of the weights and forces encountered when performing the 25 tasks selected for Questionnaire 2. This was followed with a visit to the workplace where as many actual weights and forces as possible were measured for these tasks or for other tasks identified by the supervisor as demanding.

To date, no formal detailed analyses have been made of the data in Questionnaire 2 by AFHRL or TTU. However, a preliminary analysis of a sampling of four responses per AFSC for a total of 16 AFSCs conducted by TTU continued the serious doubts of TTU concerning the questionnaire usefulness. In the near future, a detailed analysis of the returns from four AFSCs will be made by TTU.

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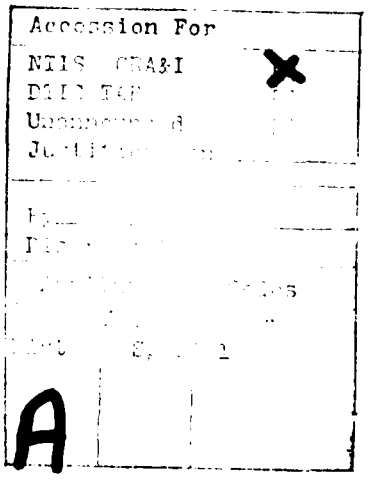

SUMMARY

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INTRODUCTION

OBJECTIVES

The primary objective of this project is to develop and validate an objective criterion with which the Air Force can reliably evaluate the compatibility of an individual's physical capacities with the physical demands of the various Air Force Specialty Codes (AFSCs). The validity of the criterion will be measured by the individual's ability, or inability, to successfully perform a selected set of well defined, significantly demanding tasks within an AFSC.

The methodology for accomplishing the objective is divided into several phases. Each of these phases and their interrelationships and interdependencies, as related to the development of the objective assignment criteria, is an inherent part of the technical effort to be performed.

Validation of the Initial Assignment Criterion is intended to demonstrate that an individual's strength and stamina assessments (measured by primary test battery) are within a small percent of the individual's strength and stamina assessments (measured by secondary test battery) and successfully predict an individual's capability to perform work requiring a specified level of demand.

Furthermore, validation of the Final Assignment Criterion should demonstrate that assignment tests can be used to classify individuals according to their ability to perform work with a certain level of demand. This method is designed to demonstrate that approximately 95 percent of the individuals successfully performing the tasks classified as requiring a certain level of demand can pass the test with a certain or larger strength requirements, and that approximately 95 percent of the individuals who have not performed successfully on tasks classified as requiring a certain level of demand cannot pass the tests with an equivalent or larger strength and stamina requirements.

The following is a summary description of the categories of activities and the key factors to be considered:

1. Job Analysis

Perform a comprehensive job analysis encompassing the following activities:

An operational definition of the levels of physical demands of tasks.

A procedure for task analysis and quantification of those tasks which have significant physical demands.

Quantification of the demands of tasks which require significant physical demands.

Identification of well defined tasks which will be referred to as Performance Criteria Tasks (PCTs).

2. Translate Job Demands to Physical Capacities

Job demands will be translated to physical capacities by:

Identification of a battery of objective Strength/Stamina Aptitude Tests which can be used to accurately determine an individual's maximum safe physical capability to perform significantly demanding tasks as defined in the job analysis activities above.

A manual to describe the tests used in the battery, the procedures and equipment required in the administration of the tests, and use of resultant scores. These manuals can be used for training personnel prior to having them administer the test batteries.

The Strength/Stamina Aptitude tests will take into consideration the following factors:

Consistency with the strength and endurance values resulting from the initial task analyses and quantification.

Upper body strength, lower body strength, and whole body strength.

Present versus potential future physical condition, Armed Forces Entrance and Examining Station (AFEES) and Basic Military Training (BMT) schedule impacts.

Test administration in terms of equipment, time, and personnel.

3. Validation

The finalization and validation of assignment criteria will take into consideration the following factors:

An "assignment criterion" (both initial and final) that is to be used to evaluate the physical capacities of personnel to be enlisted and/or reassigned in order to predict success or non-success in heavy jobs.

Validation of the analysis of the Initial Assignment Criterion and subsequently the Final Assignment Criterion.

Documentation of the completed project which will include the Primary and Secondary Test Batteries and a test manual for each battery.

MASTER PROGRAM SCHEDULE

The Master Program Schedule is shown in Table 1. This schedule depicts the major milestones to be accomplished within each category of program activites. For convenience, the activities are time-phased with reference to the three scales (calendar year, fiscal year, and months from go-ahead). This schedule has been revised to show the current status of the project in terms of completed, on-going, and projected activites.

This second annual report focuses primary attention on the significant accomplishments during the second year of the project. This is followed by a summary look into the expected future accomplishments for the remainder of the project.

Table 1. Master Program Schedule

PROJECT ACTIVITY	Calendar Year	1978			1979									
	Fiscal Year				FY '79									
	Month	O	N	D	J	F	M	A	M	J	J	A	S	
JOB ANALYSIS														
.Assemble Task Lists for 240 AFSCs		X	-	-	-	-	-	-	-	-	-	-	-	X
.Develop Survey Questionnaire to Identify AFSC Tasks Requiring Significant Physical Demands				X	-	-	-	-	-	-	X			
.Modify Survey Plan (Two Questionnaires)							X	-	-	-	X			
.Administer Questionnaire 1									X	-	-	-	-	X
.Develop Questionnaire 2								X	-	-	-	-	-	X
.Identify Requirements for Questionnaire 2										X	-	-	-	X
.Conduct Sample Survey of Questionnaire 2										X	-	-	X	
.Refine Questionnaire 2												X	-	X
.Analyze Questionnaire 1 Data												X	-	X
.Develop Sampling Scheme for Selecting Task Lists for Questionnaire 2												X	-	X
.Select Tasks/AFSC to be used in Quest. 2 (Wave 1)												X	-	
.Validate Tasks Selected for Quest. 2 (Wave 1)													X	
.Finalize Tasks Selected for Quest. 2 (Wave 1)												X	-	
.Identify Interface with PROMIS Program												X		X
.Perform Hazard Analysis & Procure Test Equipment for Task Quantification								X	-	-	-	-	-	-

PROJECT ACTIVITY	Calendar Year	1979			1980									
	Fiscal Year				FY '80									
	Month	O	N	D	J	F	M	A	M	J	J	A	S	
.Select Tasks/AFSC to be used in Quest. 2 (Wave 1)		-	-	-	-	-	X							
.Validate Tasks Selected for Quest. 2 (Wave 1)		-	-	-	-	-	X							
.Finalize Tasks Selected for Quest. 2 (Wave 1)		-	-	-	-	-	X							
.Perform Hazard Analysis & Procure Test Equipment for Task Quantification			-	-	-	X								
.Revise/Finalize Format for Questionnaire 2		X	-	-	-	-	X							
.Pilot Survey using Questionnaire 2			X	-	-	-	X							
.Evaluation of Pilot Study Results				X										
.Administration of Questionnaire 2 (Wave 1)					X	-	-	-	-	-	X			
.Preliminary Evaluation of Quest. 2 Results								X	-	-	-	X		
.Select Tasks/AFSC for Quest. 2 (Wave 2)				X	-	-	-	-	-	-	X			
.Development of Field Validation Procedures				X	-	-	-	X						
.Testing of Field Validation Procedures						X	-	-	-	X				
.Finalization of Field Validation Procedures								X	-	-	-	-	X	
.Field Data Collection						X	-	-	-	-	-	-	-	-
.Development of Data Handling Procedures												X	-	-
.Preliminary Field Data Analyses														X

Table 1. Master Program Schedule (cont.)

PROJECT ACTIVITY	Calendar Year	1980			1981								
	Fiscal Year	FY '81											
	Month	O	N	D	J	F	M	A	M	J	J	A	S
JOB ANALYSIS													
.Field Data Collection		----------X											
.Field Data Analysis		----------X											
.Selection of Performance Criteria Tasks (PCTs)					X----------X								
.AFEES and BMT Schedule Analysis									X-----X				
MODIFICATION OF FACTOR-X TEST			X----------X										
TRANSLATE JOB DEMANDS INTO PHYSICAL CAPACITIES													
.Translate PCTs' Requirements in Physical Demands						X----------X							
.Test Documentation and Inventory						X----------X							
.Identification of Candidate Tests for Battery												X-------	

PROJECT ACTIVITY	Calendar Year	81	1982			1983			
	Fiscal Year	1982				1983			
	Quarter	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
TRANSLATE JOB DEMANDS INTO PHYSICAL CAPACITIES									
.Identification of Candidate Tests for Battery		---X							
.Administration of Likely Test to a Sample of Individuals		X-X							
VALIDATION OF ASSIGNMENT CRITERION									
.Selection of Secondary Test Battery and Development of Final Assignment Criterion		X------X							
.Selection of Primary Test Battery and Development of Final Assignment Criterion		X------X							
.Location of Test Stations during Validation		X----X							
.Longitudinal Validation of Assignment Criterion			X----------X						
.Documentation of Primary and Secondary Test Batteries and their Administration Procedures							X---X		
FINAL REPORT									X-X

SIGNIFICANT ACCOMPLISHMENTS DURING YEAR 2

OVERVIEW

During the first year of this project, a plan was developed for surveying the task demands of the AFSCs using a two questionnaire format. These were to be complimentary survey questionnaires serving as the primary vehicle for generating the input data needed for performing an analysis of the AFSCs to quantify not only tasks requiring significant physical demands, but all physical tasks down to the least demanding. A "wave" concept was devised for administering the surveys in the field with data from a wave of the presurvey or Questionnaire 1 being used to select the tasks for the more detailed study in the strength and endurance study or Questionnarie 2.

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QUESTIONNAIRE 2

Finalization of Questionnaire 2 Format

Development of the TTU section of Questionnaire 2 was a primary effort of Year 1. The format that resulted from that work was described in last years report (Ayoub et al., 1979) and was forwarded to AFHRL for use. Changes in the general format and in the wording of some questions of the TTU section were made by AFHRL. These were discussed with TTU and a final format agreed upon in December 1979. An example of the revised Questionnaire 2 is shown in Appendix A.

Exponential Sampling Scheme for Questionnaire 2 Task Selection

The problem of selecting tasks from the 13 ranges (2.5 - 3.0, ..., 8.5 - 9.0) obtained from analysis of Questionnaire 1 by AFHRL was addressed in the progress report for the period October 1, 1978 - September 30, 1979 (Ayoub et al, 1979). In the exponential sampling schemes ultimately used, the number of tasks selected from each of the 13 ranges utilized an exponential weighting scheme symbolized by $W_1 = \exp(2.5)$, $W_2 = \exp(3.0)$, ..., $W_{13} = \exp(8.5)$. The number of tasks selected from the i-th range was

$$n_i = \frac{f_i w_i}{\sum_{i=1}^{13} f_i w_i} \, n, \qquad i = 1, 2, \ldots, 13,$$

where n was the number of tasks to be selected and f_i was the number of tasks available in the i-th range.

The use of exponential weights assures the selection of more tasks from the heavy side of the demand scale. Using these exponential weights, however, sometimes results in larger sample sizes than the actual number of tasks available in some of the subintervals. For example, there may be only four tasks available for selection, but this sampling scheme may require 10 tasks to be selected. This variance also exists when linear weights are used, but to a lesser degree. One way of adjusting the method is to use a "roll-down" procedure, that is, pick all four available tasks from the subinterval and select the remaining six from the next lower subinterval under consideration. Table 2 illustrates the situation. In this example, the intervals 7.0-7.5, 7.5-8.0, 8.0-8.5, and 8.5-9.0 had no tasks available. The use of exponential weights requires more tasks to be selected than are present in the subintervals 6.0-6.5, and 6.5-7.0. Therefore, using the "roll-down" would require additional tasks to be selected from lower ranges.

For approximately one-half of the 43 AFSCs in Wave 1, this trend of fewer tasks available than required occurred in the higher intervals. The "roll-down" procedure, however, resulted in the selection

Table 2. Example of Tasks Sampling Using Exponential Weighting Scheme and Roll-Down Procedure

Range	w_i	f_i	n_i	n_a
6.0-6.5	665.14	4	10	4
5.5-6.0	403.42	3	4	3
4.5-5.5	244.69	2	2	2
4.0-4.5	148.41	2	1	2
3.5-4.5	90.02	6	2	6
3.0-4.0	54.60	0	2	4
2.5-3.5	33.12	1	2	2
2.0-3.0	20.09	9	1	1
2.0-2.5	12.18	1	1	1

where:

w_i = exponential weights

f_i = number of tasks available for selection

n_i = number of tasks to be selected using exponential weights

n_a = number of tasks selected using roll-down procedure (tasks not available for selection in one range are taken from next possible range)

of 25 tasks for each AFSC without extending below the lowest 2.5 interval. In addition, statistical data on the percentage of airmen participating in the performance of each task were utilized. As a rule, any task with less than five percent participation was not selected to insure a larger response rate from those taking the survey.

For the most physically demanding six AFSCs, a total of 50 tasks were selected using the same sampling scheme. This permitted greater coverage across the range of subintervals but required slightly more supervisors to participate in the survey.

A similar exponental sampling scheme was used in selecting the 25 tasks for each of the AFSCs in Wave 2 of Questionnaire 2. In this case, however, the selection process resulted in some tasks falling within the subintervals below 2.5 due to a decrease in the overall physical demands as compared with Wave 1. Again, any task with a percent participation rate below five percent was not selected.

Questionnaire 2 Pilot Study

In November of 1979, AFHRL conducted a pilot study of Questionnaire 2 using 40 supervisors (10 each in 4 AFSCs). During December, a brief review of the 27 booklets returned was made by two of the TTU team members. When they compared task responses in Section III (the TTU section) with the same tasks in Section II (the AFHRL section), they frequently found no apparent relationship between them. For instance, in Section II, lifting activity might be given a strength rating of 8 or 9 indicating a signficant demand while the same task in Section III would be marked with no or very light demands for lifting. They also noted a tendency for the supervisor to start using the same ratings for both the strength and endurance scales of Section II part way through their responses to the 100 tasks in that section. It is felt that the discrepancies between the sections were the results of fatigue from marking so many tasks in Section II and from difficulties of the supervisor in adjusting to the differences in instructions.

Preliminary Evaluation of Questionnaire 2 Data

Questionnaire 2 was sent out by AFHRL to supervisors in forty-three AFSCs. By April, 1980, many of the completed questionnaires had been returned to AFHRL. In order to determine if some correlation existed between the task ratings (scale from 0-9) in Section II (AFHRL) and the responses in the detailed TTU questions in Section III (TTU), the responses of four supervisors (chosen at random) from each of sixteen AFSCs were considered.

The two variables considered were: strength rating (SR), from the first part of the questionnaire, and weight (or force) (W/F) from the second part of the questionnaire. These variables were considered for each of the four activities: Lift/Lower (L/L), Push/Pull (P/P), Carry

Table 3. Correlations Between Strength Rating in Section II and the Weight/Force Value in Section III of Questionnaire 2

	AFSC	L/L	P/P	C	T	OVERALL
1.	Helicopter Maintenance	.53	.41	.44	.68	.52
2.	Pavement Maintenance	.22	-.31	.04	-.32	-.21
3.	Pararescue Recovery	.10	.03	-.16	N/A*	.01
4.	Bomb-Navigation System	.32	.67	.27	.89	.53
5.	Missile Electronic Equipment Specialist	.67	.26	.53	.81	.54
6.	Outside Wire and Antenna Maintenance	.13	.41	.47	.30	.31
7.	Missile Systems Cable Splicing & Maintenance	.48	.24	.22	.00	.35
8.	Aircraft Maintenance	.34	.16	.19	.53	.27
9.	Electrical Power Line Maintenance	.39	.22	.64	.08	.40
10.	Vehicle Maintenance	-.16	-.06	.00	.01	-.04
11.	Survival Specialist	.29	-.21	.18	N/A*	.14
12.	Security and Military Working Dog Qualified	-.31	.16	.31	N/A*	.20
13.	Fire Protection	.51	.49	.38	.35	.46
14.	Meat Cutter	.65	.50	.52	-.43	.52
15.	Fuel Services	.31	.05	.30	.06	.18
16.	Security Police	.73	.07	.03	N/A*	.11

* Not applicable as the data were not available.

Key:

LL = Lift/Lower activity
PP = Push/Pull activity
C = Carry activity
T = Torque activity

(C), and Torque (T). It was felt that there should be a certain amount of agreement between the overall rating of a task in Section II and the specific response in Section III in order to continue to collect data via questionnaire 2.

Several correlation measures were used (including Kendall's tau and the simple r). They all yielded virtually similar values. Thus only the values of the simple correlation coefficient, r, used to determine the correlation between SR and W/F, are displayed in Table 3.

A look at Table 3 shows that there is not a substantial amount of correlation between Strength Rating and Weight/Force. In fact, in some cases, such as in the Pavement AFSC, there are negative correlations. No attempt will be made to state the reason for this occurrence. The purpose was solely to obtain some idea about the agreement between SR and W/F, and not to make a judgement as to why supervisors responded as they did.

At the time this analysis was carried out there were no data available from the field. A substantial amount of field data has since been obtained. Furthermore, additional questionnaire 2 data have been obtained from AFHRL and have been computerized. The preliminary analyses that have been conducted will be replaced with further analyses involving questionnaire 2 data and field data which give the actual weights and forces, etc., on the actual tasks. The correlation between the questionnaire data (both Sections II and III) and the field data will be studied at a later time This should give us a clearer answer as to the credibility of questionnaire 2 data.

FIELD VALIDATION

Development of Interview Techniques

During the development of Questionnaire 2, long range plans were made for field validation of the data obtained by the survey. The field work was intended to be done on a limited scale compared to the survey questionnaire. The data obtained from the field validation were to be used to "adjust" the questionnaire results. It was originally intended to conduct the field studies after receiving the data from each wave of Questionnaire 2. However, with the delays encountered in getting Questionnaire 2 into the field, it was decided to start field validation work earlier, resulting in it running concurrently with the questionnaire.

The field validations were developed around a two-stage format: an interview and a verification. The interviews were to be conducted using the tasks selected for Questionnaire 2 as a guide so that comparable data could be obtained. The interviews were planned to last no more than 1-1/2 hours. The verification step consisted of obtaining actual measures of the task demands, especially in terms of the weights and forces required.

The format for the interview consisted of four steps. A brief description of the project and its objectives was first given to each supervisor as most had been given very little prior explanation. Next background information on the supervisor was collected. The more "formal" part of the interview was initiated by asking the supervisor to rank the task list for his AFSC in order from the most to the least physically demanding. The 25 tasks were coded with the letters A through Y. Examples of the instructions and a task list are shown in Tables 4 and 5 respectively. The supervisor's rank order was then transferred to the principal interview sheet and used to set the pattern for the major part of the interview.

The front of this interview sheet (Figure 1) was organized around the manual material handling activities used in the development of Questionnaire 2. Therefore the primary catagories were lift/lower, carry, push/pull, and torque. However a column was provided to obtain information on other activities. The activities were coded using the letter shown in Table 6.

The interview format originally developed was designed to quickly survey the task list to determine the number of demanding activities in each catagory. The supervisor was asked to identify which demanding activities were found in each task. These were indicated by a mark in the upper left small box in the appropriate activity columns. After surveying all tasks, the marks in each column were to be totaled. The interviewer would then go back through the list concentrating on just the predominate activities. For these, he would ask for an estimate of the weight or force involved which was recorded in the large square and the usual posture involved which was recorded

Table 4. Instruction Sheet for Task Ranking Used During Field Interviews

INSTRUCTIONS FOR RANKING TASKS ON TASK LIST

You are asked to rank a list of 25 representative tasks performed in your AFSC. When comparing one task against another, consider only the physical demand required to perform each task-not how frequently, or infrequently, you may perform each task.

Physical demand includes both strength and endurance. Strength and endurance are found in tasks which include heavy muscular demand, or frequent and continuous exertion of muscular effort. For example, in one task you might lift a heavy weight once. In another, the weight might be considered light if lifted only once, but the task requires many repetitive lifts. The first example requires strength, and the second, endurance; but both are physically demanding tasks.

Rank the 25 tasks in order from 1 to 25, according to the physical demand required to perform each task. The task you rank number 1 should be the most physically demanding task on the list. Number 25 is the least demanding.

If you have not performed a task and cannot rank it, mark it NA (Not Applicable) and proceed to rank the remaining tasks.

If you have performed a task(s) that is not on the list but is significantly demanding (i.e., it ranks with the top five tasks you have ranked), then inform the interviewer in the discussion which follows.

Note: Security classification of this interview is "Unclassified"

Table 5 Example of AFSC Task List Used During Field Interviews

TASK SHEET	AFSC 304X4 Ground Radio Equipment and Repair	K-009
TASK	RANK	TASK DESCRIPTION
A		Remove or install power supply systems (F 193)
B		Remove or install permanent type antenna systems (F 191)
C		Remove or install multiple channel HF power amplifiers (F 167)
D		Remove or install consoles other than launch control consoles (F 189)
E		Remove or install single channel SSB power amplifiers (F 220)
F		Set up mobile communitcations vans for use (F 245)
G		Remove or install multiple channel HF transmitters (F 170)
H		REmove or install multiple channel or track recorder & reproducers (F 176)
I		Remove or install multiple channel UHF transmitters (F 181)
J		Remove or install multiple channel UHF power amplifiers (F 178)
K		Dig trenches (L 662)
L		Remove or install UHF transmitters (F 235)
M		Set up tents or 1948 shelters (L 672)
N		Remove or install multiple channel UHF receivers (F 180)
O		Remove or install UHF transceivers (F 224)
P		Lay electrical or communitcations cables (L 664)
Q		Set up bath, kitchen or sanitation facilities (L 669)
R		Remove or install multiple channel HF transceivers (F 169)
S		Remove or install UHF linear power amplifiers (F 232)
T		Remove or install multiple HF receivers (F 168)
U		Remove or install facsimile systems (F 168)
V		Remove or install multiple channel UHF exciters (F 177)
W		Deliver test equipment to material control or PMEL (E 113)
X		Remove or install mobile antenna systems (F 165)
Y		Remove or install single channel SSB transceivers (F 222)

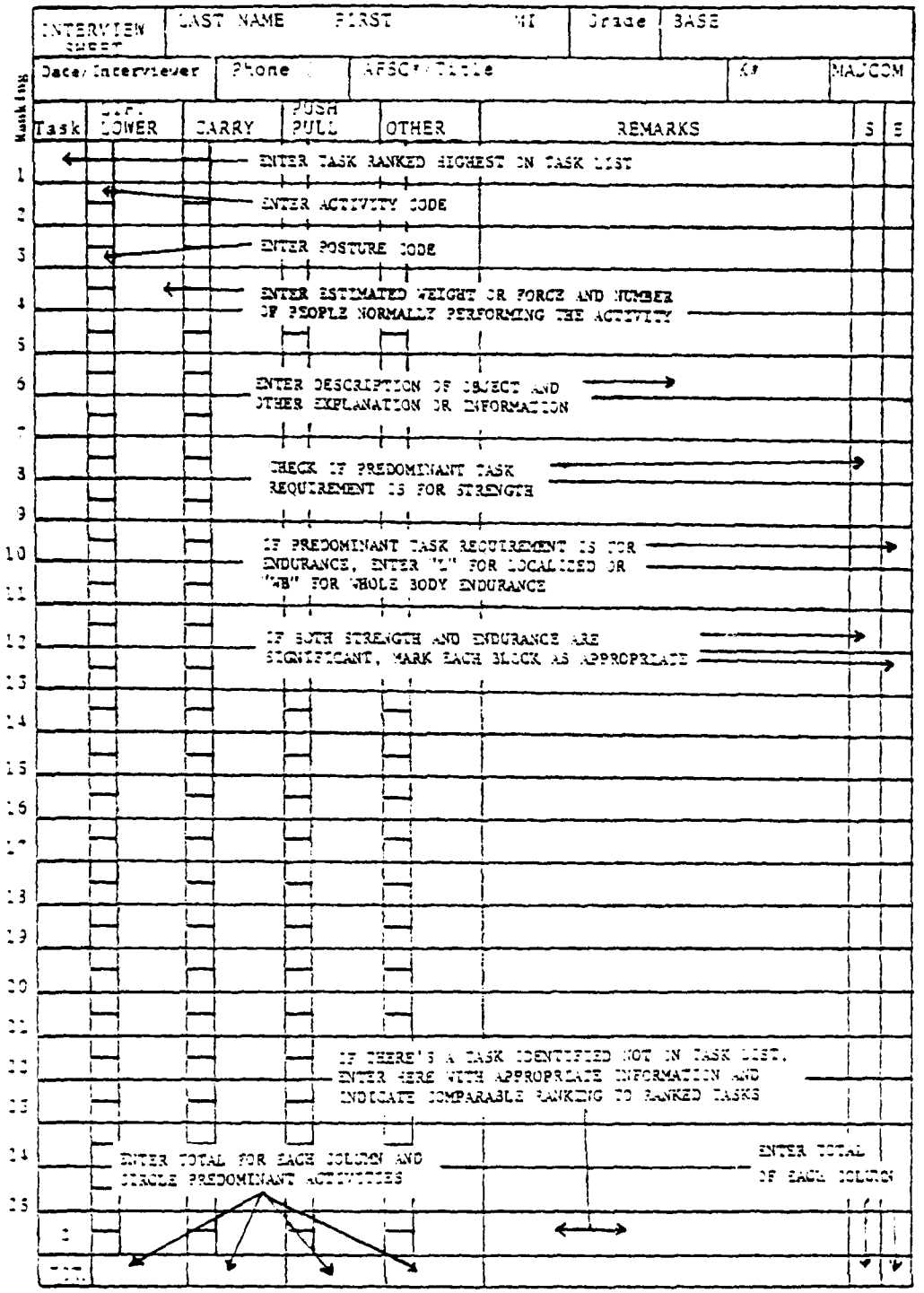


Figure 1. Front of Interview Sheet Used During Field Interviews

Table 6. Coding Sheet Used to Identify Activities and Postures on Interview Sheet

EXAMPLES OF ACTIVITIES

A Lift	F Torque/turn
B Lower	G Hold/position
C Carry	H Climb
D Push	I Shovel/dig
E Pull	J Hammer

O Other--as appropriate for your AFSC

WORKING POSTURES

1 Standing	6 Kneeling
2 Walking	7 Lying
3 Running	8 Stooping (knees bent)
4 Crawling	9 Bent at waist
5 Sitting	10 Other

in the lower smaller square using a number code (Table 6). A space was provided for general remarks specific to each task. In addition, a column was provided to assess the general strength and/or endurance requirement of the entire task. The supervisor was asked if it was more important for an individual to have strength or endurance to be successful in that task.

The back of the interview sheet (Figure 2) was originally designed for use with the verification step following the interview and to record the supervisor's comments. It was planned to select 5 representative tasks from the list of 25. For these five, an attempt was to be made to measure the actual weight or forces that the supervisor had estimated. To do this, the field team was equiped with Amtek load cells (Model CT-1000) and digital display units (Model HSC-11).

Testing and Finalization of Interview/Verification Procedures

After development of these interview procedures, several interviews were arranged at Reese AFB, Hurlwood, TX. These involved several AFSCs: Fire Protection, Pavement Maintenance, and Aircraft Maintenance. In the course of these interviews, it rapidly became evident that the initial assessment of which demanding activities were present and tallying their numbers was unnecessary. Going through the task list twice during the interview (not counting the airman's ranking step) required the individual to recall what specific aspect of the task he originally had in mind when later asked to detail these demanding activities. The airmen were usually verbally identifying a specific object and associated activity the first time through the list. Therefore it was actually more expedient just to ask what was the most demanding lift/lower, for example, determine what object was handled, and to get an estimate of the weight involved and the required posture when going through the list the first time.

It also became obvious during these interviews that the number of people involved had to be recorded since two or more people frequently participated in the activity. Thus the number of people, if more than 1, was indicated under the estimated weight by "2 p", etc. If the weight was large but still handled only by one individual, this was specifically noted as "1 p" to avoid later confusion.

During these interviews some problem also arose with the strength/endurance columns. Although the endurance column was originally intended to note cardiovascular endurance, many individuals wanted to express a requirement of the task for localized endurance. Therefore responses in the endurance column were coded "WB" or "L" to distinguish between "whole-body" (cardiovascular) endurance and "localized" muscle fatigue (as from hammering). Individuals were encouraged to choose either strength or endurance but if they insisted that both were equal, that was recorded.

Originally the interviews followed by the verification were conducted at the airman's work place. This often led to a lot of

VERIFICATION DATA						
TASK	ACTIVITY	WEIGHT OR FORCE	POS	OBJECT	REMARKS	E

General Comments: Include the following information:

1) Number of year's experience in the AFSC
2) Identify point of contact for verification within the work area and coordinate scheduled appointment

Ask for comments on the following:

1) Supervisor's suggestion/recommendation for what to test to measure physical requirements within the AFSC
2) Supervisor's experience with females and weaker males working in the AFSC
3) Supervisor's identification of the most critical task(s) for performance within the AFSC
4) Other: Training School requirements, climatic impacts, geographical factors, work schedule problems, etc.

Figure 2. Back of Interview Sheet Used During Field Interviews

interruptions and distractions making it difficult to complete the interview in 1-1/2 hours. During a trip to Wright-Patterson to show the interview format to the technical monitor, the airmen were asked to come to his office for the interviews. This proved to be a superior technique as the individual could devote his entire attention to the interview. During the interview, arrangements were made for the field team to go to the interviewer's work place at a later time for verifications. The airman indicated on a base map how to get to his shop and the best times for the team to come. If possible, a definite appointment was set up. Otherwise, arrangements were made to call the airman prior to meeting with him.

When attempting to verify the five tasks selected from the interview, it was frequently impossible to find the necessary items at the work site specific to those tasks. Therefore, any available items were weighed. Measurement of push/pull forces and torques were much more difficult. These frequently required that the task be ongoing. Wherever possible, however, that portion of the task was "set up" and the forces measured.

This "catch as catch can" approach to the verification step made the original form on the back of the interview sheet inadequate. Team members were ending up with actual weights written all over the back of the sheet. Furthermore, since they were also trying to obtain estimates of the weights/forces from additional people at the workplace (or from the interviewer if he had not originally given one), confusion started to arise later as to which values were estimates and which were actual. This meant the individual compounding the data had to spend a lot of time going to the interviewer for explanations. In addition, on subsequent interviews, confusion arose as to whether or not objects had already been weighed.

Therefore a worksheet (Figure 3) was developed to use during the verification step. Before going to the shop, the items mentioned during the interview were transferred to this sheet along with the activity and estimate. When the object was weighed or a force measured, the actual weight/force was recorded in the appropriate column. Thus on later visits to a shop, it was readily apparent what verifications had or had not been made. This sheet was also used during subsequent interviews. After finishing the regular interview, the airman was asked for estimates on any of the worksheet items that he had not mentioned.

These modifications developed during the first visits to Reese and Wright-Patterson AFB were used on subsequent trips throughout the summer. The only additional modification that was made was to record the height range involved for lift/lower activities. These were coded to indicate the starting and ending points using F for floor, K for knuckle, S for shoulder, and R for reach.

WORKSHEET K # AFSC #

AFSC TITLE

TASK	OBJECT	ACTIVITY	ACTUAL (WT. OR FORCE)	ESTIMATED (WT. OR FORCE) S1	S2	S3	S4	S5	OTHERS

Figure 3. Worksheet Developed for Use During Field Verifications

Field Data Collection

In February 1980, the initial plan for conducting interviews and verification reviews at 10 Air Force bases was developed. Although field validation of selected activities, tasks, and AFSCs had always been an integrated part of the program plan, the schedule was accelerated and formal interviews were incorporated. These revisions reflect some concerns raised from a preliminary evaluation of the aforementioned pilot test of Questionnaire 2 administered earlier by AFHRL at Lackland AFB, Texas. Consequently, the decision was made to concurrently gather field verified data on selected AFSCs for the purpose of correlation against Questionnaire 2 data. The added advantages of personnel interviews and on site verification of the physical demands required in the performance of the job were self evident.

An element of urgency dictated that the planned verification reviews be completed by the end of the summer to coincide with the anticipated receipt of completed survey questionnaires. Two basic data bases were utilized in selecting the 21 AFSCs encompassed by the plan: Questionnaire 1 ratings and percentage participation statistics on first, second, and other term enlisted personnel. In short, the AFSCs selected were believed to be representative of the most physically demanding based on the best available data at the time.

A variety of criteria was used in the process of optimizing the approach for selecting 10 Air Force Bases to be used for the field validations. For example, the "civil engineering" family of six AFSCs was scheduled at bases ranging in size from a small ATC base with limited personnel, minimum essential support and handling equipment, to the largest civil engineering operations in the Air Force at a base with several hundred personnel performing the spectrum of required jobs with a variety of material handling equipment. Another special family of functionally homogenous AFSCs were the missile weapon system career fields. The three bases chosen not only provided the data and capability to evaluate the functional differences in the jobs (i.e. missile mechanic, missile facilities, missile equipment, etc) but also the variances in the performance of each job in terms of specific weapon systems. The data collected can be segregated by two major missile systems (Minutemen Missile and Titan Missile) and by operational mission performance, or by special missile training and testing mission requirements.

Due to the large number of Air Force personnel utilized within the Aircraft Maintenance career fields (AFSCs 431X0, 431X1, and 431X2), data collection and segregation capability exists for not only evaluating the jobs by light, tactical aircraft and heavy aircraft categories, but also by each of the major aircraft shredouts within each category. This approach in developing the field validation plan and schedule provided early visibility into the differences between the physical demands of each category. Some tasks were more demanding when performed on heavy aircraft (bombers and transports); others were more demanding when working on light, tactical aircraft. Variances

existed even within the same category; i.e., accessibility to equipment on the latest F-15 or F-16 fighter aircraft was easier than with other "light" aircraft, reflecting fundamental design concepts incorporated into the engineering and development of these newer, more advanced technology weapon systems. Furthermore, some aircraft mechanics are utilized in other related jobs (Aerospace Repair Shop, Engine Depot Maintenance, etc) sometime in their career progression which, in turn, create additional variances in physical demands.

A similar approach was taken in selecting bases and collecting data for other career fields typified by the electronics and avionics AFSCs. In addition, consideration was also given to geographical and climatic factors in selection of the bases. Lastly, it was considered especially important to have a balanced stratification of interviews by major Air Force command in evaluating the differance in requirements due to mission performance responsibilities by major air command.

Having evaluated the above factors and finalized selection of bases to visit, the next step was to determine the number of interviews to be conducted at each base and to identify the tasks within any AFSC where primary stress would be placed in accomplishing the verification of data in the workplace environment. The initial target objective was to strive for an average of three interviews for each of the AFSCs reviewed. Primary emphasis would then be placed on the "top 5" tasks ranked by each supervisor interviewed. This would produce a possible range of 5-15 tasks to be verified for the predominent action in each of the 21 career fields. Recognizing that it would not always be possible to find all the objects or equipment readily available in the work areas for measurement, the team targeted its planning objective for verifying three of the five top ranked tasks identified by each supervisor interviewed. Where it was impractical to measure the weight or force applied to an object or piece of equipment, the team members investigated the existance of official documentation, such as Tech Order publications, to obtain the data. This source of data proved to be a valuable supplement to the collection of verified data, especially in such career fields as aircraft maintenance, avionics, loadmaster, egress systems, radio equipment, etc., where technical manuals used frequently in the performance of the job are readily available and contain weight data by specific weapon systems.

Additional information and data were collected during surveys of the supervisor's work area and in discussions with other personnel (i.e. working associates, subordinates, and/or superiors of the supervisor interviewed). Typical information included scenarios on the work schedule and working environment, material handling equipment available, unique mission requirements, adverse climatic and working conditions, participation on special missions and/or exercises, comments from first-term airmen and females working in the AFSC, and miscellaneous other pertinent information. To a limited degree, photographs were taken of the worker performing a physically demanding task in an unusual position, a confined work space, and/or handling a

heavy object or piece of equipment. When available, technical publication libraries were researched for pertinent data, with the assistance of authorized, assigned personnel. A very valuable source of information and expertise were the functional experts at major air command headquarters; for example, the Loadmaster NCOIC for each of the mission aircraft assigned to Headquarters MAC, the Life Support Equipment NCOIC at the same command headquarters, and the Minuteman and Titan missile system evaluation teams at Vandenberg, AFB provided invaluable assessments of job requirements and personnel performing within their career field through the command.

As mentioned, Reese AFB was used as a pilot test base to test, revise, and refine interview and data collection procedures. It also provided an excellent means of training new team members in a controlled environment prior to initiating formal interviews at the bases designated in the field validation plan. Appendix B then portrays a sample of the actual data collected. For illustrative purposes, AFSC 304X4, Ground Radio and Equipment Repair, is portrayed on the basic documentation employed by the team.

Official coordination, clearances, and detailed schedules for each base visit were handled by a designed official from the program technical monitor's office (AFAMRL). This timely and thoughtful support was invaluable to the team, making the performance of their job easier and more efficient. Proper clearances and approval for the visits were first obtained through each of the major air command headquarters. Thereafter, each base visit was arranged for by a request letter to the base commander's office followed by an approval response. Detailed arrangements were then coordinated with the designated point of contact, a CBPO (Consolidated Base Personnel Office) representative, at least three weeks in advanced of the planned visit. Follow-up coordination was accomplished normally one week before arriving on a base visit. Without exception, all base visits were completed smoothly thanks primarily to the professional competency of the personnel who handled the administrative details for scheduling the interviews, reserving excellent facilties for conducting the interviews, and properly notifying concerned participants and their supervisors. The team received a warm welcome and total support for their activity at each and every base they visited. This was especially gratifying and recognized in personal letters of thanks to those responsible for providing this essential support.

The field validation review team was composed of a retired career Air Force officer as team chief and five team members. A general pattern of assigning specified AFSCs to the same team member proved valuable as the individual team member quickly built up a more detailed understanding of a career field by conducting most of the interviews for the specifically assigned AFSC. Assigning special AFSCs to a team member on the basis of some related experience in the career field also was beneficial. For instance, the retired Air Force Officer who possessed extensive flying experience and prior assignments in the System Program Office for three of the latest fighter

aircraft in the inventory and one of the major missile systems conducted many of the interviews of aircraft mechanics, loadmasters, avionics systems, and missile system supervisors. Another team member experienced in the breeding and training of dogs, conducted the interviewing of supervisors with AFSC 811X0A and 811X2A, Security Police and Law Enforcement, military dog qualified. Another auto hobbyist team member handled the family of Vehicle Maintenance AFSCs; and another as an experienced "poleclimber" conducted similar job related interviews such as AFSC 542X1, Electrical Power Line career field.

As mentioned previously, interview and verification procedures were constantly being refined and improved with each of the early visits to bases. Time saving techniques were integrated with improved data collection procedures to produce a more efficient and effective operation by the team. Almost imperceptibly at first, the team was able to increase the number of interviews conducted while concurrently obtaining more comprehensive data on each interview and verification review. The advantages of on-site personal interviews with experienced supervisors was readily apparent. All of these factors, combined with the addition of two more team members and additional measuring equipment, resulted in a reorientation of the team's objective from one of gathering verified data for the ultimate purpose of correlating it to Questionnaire 2 responses to one of actually verifying more of the 43 AFSCs covered by the Wave 1 survey.

Appendix C presents a summary of the actual bases visited, the number of interviews conducted, and the number of AFSCs reviewed. Of the total 43 AFSC's being surveyed under Wave 1, 40 of the AFSCs have been validated to varying degrees. Two additional AFSCs (443X1, Missile Pneudraulics Repair and 445X1, Missile Liquid Propellant Systems) were also verified, making a total of 42 AFSCs covered by the verification reviews completed to date. The corresponding total number of supervisors interviewed is 180. These totals constitute an increase of almost 300% in the number of originally planned interviews and a 100% increase in the number of AFSCs to be reviewed. Although the majority of these AFSCs can be considered validated, except for miscellaneous follow-up inquiries, it is estimated that five more base visits will be required to complete the verification of all the 43 AFSCs in the Wave 1 survey. Appendix D presents a planning estimate of the follow-on schedule required to complete the field validation of these AFSCs.

Table 7 contains a summary breakout of the 180 supervisors interviewed by grade and major air command assignment. The grade distribution indicates a desirable spread rather than an overloading in the lower grades of less experienced airmen. The average total years of experience within the AFSC career field was almost 12 years and the vast majority of supervisors has attained the fully qualified 7-level within their AFSC. A comparison with the average experience of those having taken the survey questionnaire will be made shortly with receipt of the completed survey data; however, a preliminary look at the initial responses from the first four AFSCs also shows an

Table 7. Summary of Supervisors Interviewed By Grade and Major Air Command

Supervisor		Major Air Command					
Grade	Number	SAC	MAC	TAC	ATC	AFLC	Other
CMS	6		5	1			
SMS	6	1	2	2	1		
MSG	31	16	6	7		1	1
TSG	73	43	13	11	1	3	2
SGT	42	21	9	7		4	1
SGT & Lower	22	14	3	2		3	
Totals	180	95	38	29	3	11	4

average experience factor of 12 years for those completing the survey questionnaire.

Table 7 also reflects a representative distribution by major air command of assignment. As expected, the predominent command of assignment is the Strategic Air Command (SAC). This can be partically attributed to the fact that eight of the AFSCs are in the "missile family" of jobs related to the Titan and Minuteman weapon systems; both of these strategic weapon systems come under this operational control and responsibility of SAC. To a lesser degree, the aircraft maintenance, bomb-navigation systems electronic warfare systems, and "avionics" AFSCs contribute substantially to the total of 95 supervisors interviewed.

Again, the response and support of this research project by Air Force personnel contacted by the team was highly commendable. In summary, the benefits derived from these field validation trips exceeded even our most optimistic objectives for obtaining meaningful data in a reasonable period of time.

Development of Data Handling Procedures

A field interview data base has been initialized for on line inquiry, update and processing. The contents of this data base are summarized in Table 8.

The data base is logically structured with two hierarchical segmentation levels. There is one header label (Card 1) for each separately measured physical object within each AFSC. This header segment describes the physical object, the manual activity associated with it, and posture assumed during the activity.

For each header segment corresponding to uniquely identified objects, there is one or more Supervisor Segments (Card 2). One of these detailed segments is created for each supervisor who provided estimate information regarding the physical object described in the header segment. This detail segment contains information regarding the supervisor, number of persons involved in the activity, and the supervisor's estimate of weight/effort data.

The field interview/verification data are first manually validated by spot check, and transcribed to data entry coding sheets. The next step is to perform on line batch up-date processing using a general purpose remote terminal text editor and command language (WYLBUR).

Prior to final data base up-date, the batched insertation transactions are verified by feasibility testing with the aid of a general purpose data analysis software package with SAS (Statisical Analysis System). Data entry errors are then identified and corrected, in a repeating cycle, until the data are clean enough for final data base update.

Table 8. Storage Format for Computerized Field Validation Data

DATA ELEMENT CODE	MAXIMUM COLUMNS TO BE OCCUPIED	DATA ELEMENT DESCRIPTION
CFC1	2	Card No.
KNO	4	K No. (Assigned by AFHRL)
LNO	3	Line No. on Worksheet
TASK	13	Task Code Letter
POST	8	Posture Code No.
ACTIV	4	Activity Code
ACTWT	5	Actual weight
NPAC	2	No. of persons (involved in actual weight)
NE	3	Total No. of supervisors & others
OBJTI	36	Object title
	-- end of card 1 --	
CFC2	2	Card No.
KNO	4	K No.
LNO	3	Line No. on Worksheet
SO	3	Supervisor's No./Other's No.
ESTWT	5	Estimated total weight
NPES	2	No. of persons (involved in estimated weight)
	(Repeat SO, ESTWT, NPES on card as needed).	
	-- end of card 2 --	

(There may be additional cards using the card 2 format numbered 3, 4, etc., depending upon the number of persons interviewed.)

When completed, the full data base will be submitted to summary and overview analysis in order to gain quick response on the quality or levels of data being collected in the field interviews.

Preliminary Analysis of Field Validation Data

Since computer entry of the field validation data was not completed prior to the end of this reporting period, no detailed analyses of the data have been made. Two preliminary analyses have been made, however. One was a correlation of the interview (estimate) and verification (actual) data and the other was a plotting of the distribution of weights or forces by activities. These are discussed below.

Some preliminary analyses were performed on interview data that were obtained prior to the summer of 1980. The supervisors gave estimates of the weights (or forces) required for Lift/Lower (LL), Push/Pull (PP), and Carry (C) activities relevant to various tasks in their AFSC's. The actual weights (or forces) required to perform the activities were then measured (verified). The following Pearson correlation coefficients between the estimates and the actual values were obtained, where N represents the number of pairs of estimates and actual values and R represents the correlation coefficient:

LL, N = 448, R = 0.814
PP, N = 121, R = 0.488
C, N = 183, R = 0.882.

The value for N does not represent the number of supervisors, but the number of estimates and actual values. That is, each supervisor gave one or more estimates. The smaller value of R for PP could be due to the fact that it is not as easy to give an estimate for a PP activity as it is for an LL or C activity.

Some manual tabulations have been made from the worksheets which provide some general information on the distribution of the data. Table 9 presents a summary of the data collected for the major activities performed, with a breakout by supervisors estimates and actuals (verified value). Not included in the summary data on five other activities performed less frequently (i.e. climbing, digging, hammering, etc.) Lift/lower was the most predominant activity, followed in order by carry, push/pull, hold/position, and torque. Additional activities were also identified which were specific to certain AFSCs. For instance, although torquing was idntified in the performance of about one-fifth of the AFSCs, it was only of significance in a few jobs such as the Vehicle Maintenance family of AFSCs. Climbing is a very demanding activity in such special career fields as AFSC 542X1, Electrical Power Line.

Figure 4 presents a frequency distribution of the number of times as actual and/or estimate occurs (recorded by weight value plotted by five-pound intervals on the weight scale) for the lift activity. As

Table 9. Summary of Data Collected In Verification Reviews, Estimates and Actuals by Activity

Activity	Total		Actuals (Verified)		Estimates By Supervisors	
	Number	%	Number	%	Number	%
Lift/Lower	5884	55.5	1616	15.1	4268	40.3
Carry	3405	31.3	916	8.3	2489	23.0
Push/Pull	967	9.2	257	2.4	710	6.8
Hold/Position	340	3.2	52	0.5	288	2.7
Torque/Turn	85	0.8	8	0.1	77	0.7
	10,681	100.0	2,849	26.5	7,832	73.5

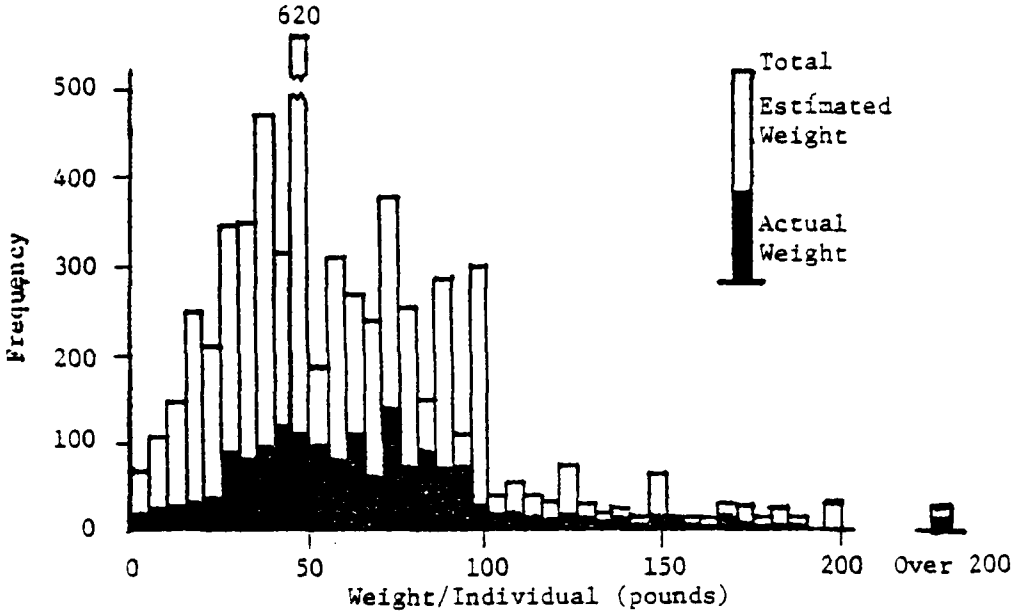


Figure 4. Frequency Distribution of Weight for Lift/Lower Activities (field validation data combined for all AFSCs)

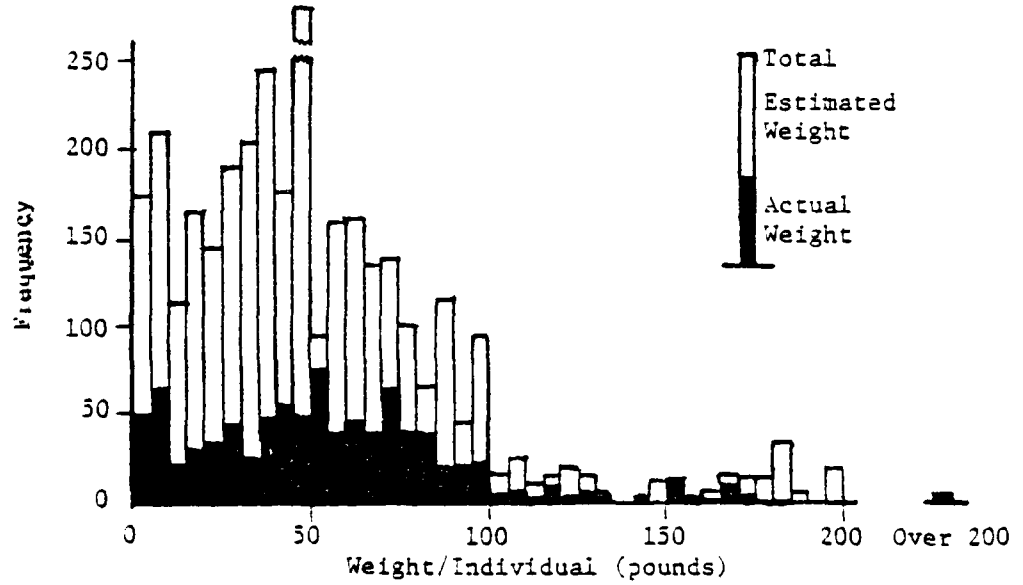


Figure 5. Frequency Distribution of Weights for Carry Activities (field validation data combined for all AFSCs)

expected, there is a pattern of peaks occurring at the 50-pound and 100-pound intervals for the estimates whereas the actuals tend to smooth out these point variations for a more meaningful portrayal. Recognizing that the current X-Factor Test being administered to new recruits at the Armed Services Entrance and Examining Station (AFEES) requires the lifting of three weights of 20, 40, and 70 pounds, it is evident that the maximum 70 pound weight is not discriminating enough for a substantial number of physical demands for lifting and lowering requirements above the 70 pound level. The same observation can be made of the summary frequency distributions for other activities of Carry, Push/Pull, and Hold/Position presented in Figures 5, 6, and 7. Some examples of the distribution for individual AFSCs for lifting are shown in Appendix E.

A preliminary analysis of endurance data for the five predominant activities indicates a frequent occurrence of tasks involving hold/position activities. Typical examples show the person lifting a piece of equipment to shoulder level or above and holding it while making some type of alignment or holding the equipment while another person bolts or fastens it into position. In a fewer number of cases, the person is holding the equipment at or below the level of his feet.

In contrast to the static endurance of hold/position activities which causes only localized fatigue, dynamic endurance may be associated with localized and/or whole-body fatigue. Identified in this area were job activities such as work projects involving sustained digging of trenches; shoveling of dirt, gravel, or concrete; climbing telephone poles or large structures; and tasks involving repeated lifts, or a sustained period of pushing/pulling or carrying. As was expected, certain AFSCs such as Fire Protection and Pararescue Recovery have extremely heavy whole-body endurance demands.

In addition to the preliminary analyses described above, A variety of other data is presently being considered for analysis: Supervisor rankings of the 25 tasks within his AFSC, strength and endurance ratings by task, start-to-finish lift/lower levels, and miscellaneous information on climatic conditions, identification of critical tasks performed in each AFSC, applicable weights of objects contained in technical manuals collected, and others.

In summary, preliminary analyses are just getting underway for the program. More substantial determinations and continued progress performance will be one of the key subjects for the next report. The single most important finding at this time, however, is the realizaiton that the field validations conducted during this reporting period procedure the best data that can be attained. Information received from the survey quesitonnaires may support this effective source of meaningful data but it cannot surpass it.

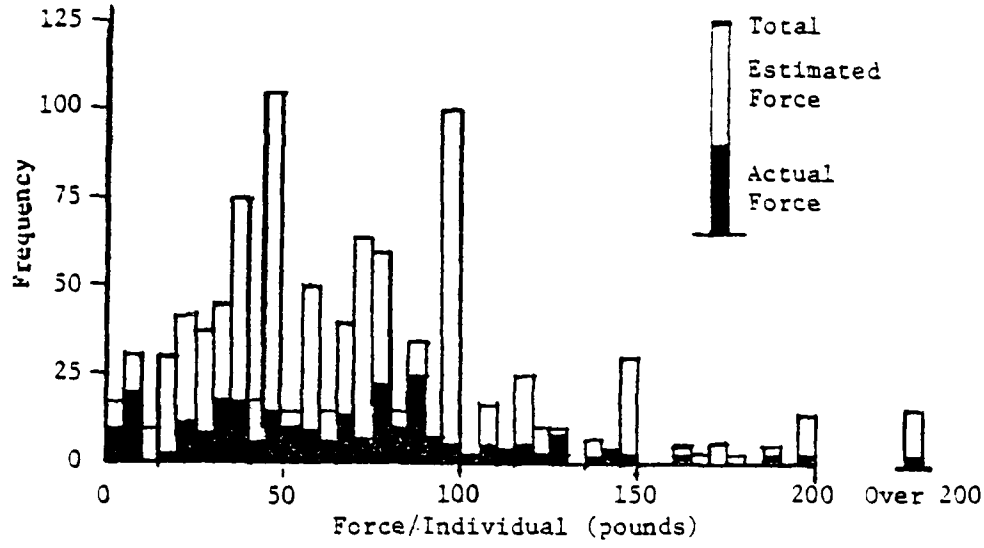


Figure 6. Frequency Distribution of Forces for Push/Pull Activities (field validation data combined for all AFSCs)

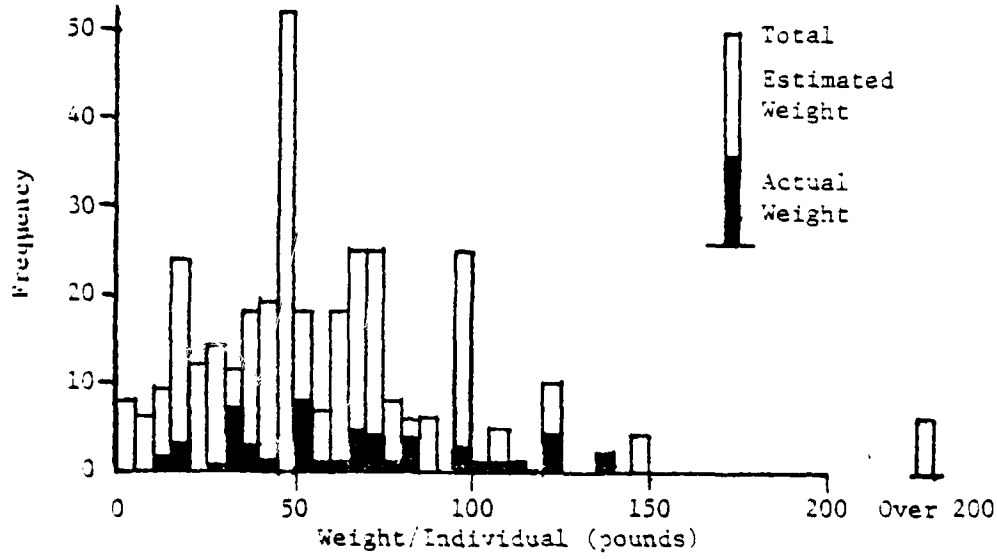


Figure 7. Frequency Distribution of Weights for Hold/Position Activities (field validation data combined for all AFSCs)

FUTURE ACTIVITIES

The Master Program Schedule shows the activities to be performed to achieve the project objectives. These reflect modifications of the original project time table caused by delays in the development and administration of Questionnaire 2. The emphasis during year 3 will be the completion of all of Phase I (task analysis and quantification) and of the majority of Phase II (test development). In addition, the project team will develop a modified Factor-X test for use with the primary and secondary test batteries. During year 4, Phase II will be completed and Phase IV (test validation) will be initiated. Phase IV would be completed in year 5 and the final report prepared. (Phase III consists of hazard evaluations for equipment for the other phases and is performed as appropriate.)

The major categories of effort and their steps to be performed to complete the project are summarized below:

Job Analysis

The objective is the analysis of Air Force tasks requiring significant physical demands. The steps to be completed are:

1. Task analysis to develop detailed descriptions of AFSC tasks,
2. AFSC task quantification in physical units, and
3. Selection of performance criteria tasks (PCTs).

Translate Job Demands into Physical Capacities

This phase is concerned with the development of appropriate candidate tests. The steps to be completed are:

1. Translation of PCTs' requirements into physical capacities relevant to successful task performance,
2. Test documentation and inventory,
3. Identification of candidate tests for inclusion within test battery,
4. Administration of likely candidate tests to a sample of individuals, and
5. AFEES and BMT schedule analysis.

Validation of the Assignment Criterion

This phase will be concerned with the selection, finalization, and testing of the assignment criterion. The steps to be completed are:

1. Selection of secondary test battery and development of final assignment criterion,
2. Selection of primary test battery and development of initial assignment criterion,

3. Location of test stations during validation period,
4. Conduct field studies to investigate the effect of BMT on measures of physical capacities,
5. Longitudinal validation of assignment criteria, and
6. Documentation of the primary and secondary batteries and their procedures for administration.

Modification of Factor-X Test

This additional effort was requested by the Air Force to develop a modification to the Factor-X test that would increase screening capability for the most physically demanding AFSCs. Use of this modification would reduce the number of misassignments as a "stop-gap" measure until the new assignment criterion is finalized. The steps to be completed are:

1. Complete Task Analysis of 21 Demanding AFSCs,
2. Simulation of Selected Tasks,
3. Simulation of Lifting Using Lifting Machine, and
4. Development of Factor-X Modified Criteria.

REFERENCES

Ayoub, M. M., Bethea, N. J., Denardo, J. D., Duran, B., Lambert, B. K., Nath, R., and Reeder, M. Establishing Criteria for Assigning Personnel to Air Force Jobs, Interim Report: 1 October 1978 - 30 September 1979, Contract No. F49620-79-C-0006, Air Force Office of Scientific Research (NL), Bolling AFB, DC 20332.

Conover, W. J. (1980). Practical Nonparametric Statistics (second edition), John Wiley and Sons, Inc., New York.

APPENDIX A

QUESTIONNAIRE #2

Note: The following is an example of the format for Questionnaire 2. It contains only a few examples of the tasks. Normally Section II contains approximately 100 tasks and Section III contains only 10 tasks.

UNITED STATES AIR FORCE

STRENGTH AND ENDURANCE SURVEY

FIRE PROTECTION CAREER LADDER

AFSCs 57130, 57150, 57170, and 57190

Return completed to CBPO within
10 working days per AFR 35-2

MANPOWER AND PERSONNEL DIVISION
AIR FORCE HUMAN RESOURCES LABORATORY
BROOKS AFB, TEXAS 78235
AUTOVON 240-2847
AFPT 80-571-167

INSTRUCTIONS

We are asking you to complete the following survey so that we can establish standards for tasks in your career field that require large amounts of physical strength and/or endurance. Other supervisory personnel in your field have completed a prior survey identifying physically demanding tasks. We are now requesting that you as a subject matter expert in this career field provide more detailed information on those tasks previously identified as physically demanding. In order to get the most from the survey, we ask that you carefully consider your response to each question.

This survey contains three sections: a brief background information section, an extensive listing of the physically demanding tasks typically performed in your career ladder, and a subset of the most physically demanding tasks. After completing the background information in Section 1, you will be asked to rate each task in Section 2 on two 10-point physical strength and endurance scales. In Section 3, you will be asked specific questions regarding the most demanding activities associated with some of these tasks.

Tasks requiring physical strength and endurance are defined as those involving significant use of the "large" muscle groups in the arms, back, or legs. These would include requirements for lifting, lowering, or carrying heavy or cumbersome objects, pushing or pulling, turning or torquing, or any other demand for frequent or continuous exertion of muscular effort. Specifically, in supplying your ratings for strength and endurance requirements, you will be asked to consider the four types of physical effort shown below. Examples of each type of effort are given.

Type of Physical Effort	Example Activity
Lifting/lowering	• lifting box onto truck or shelf • lowering installed parts from aircraft to floor • shoveling snow, cement, or gravel • climbing support structures or poles
Carrying	• carrying stores of ammunition • carrying can of foam to scene of fire • emptying tires from storage bins
Pushing/pulling	• pushing handsaw • closing or opening hangar doors • dragging hose into position
Torquing/turning	• loosening corroded mounting bolts with wrench • pumping auto jack handle • closing water main

When you consider the overall level of physical strength and endurance required by each task, it is requested that you provide ratings on the basis of:

a. The most demanding aspect of each task. For example, if performing a task requires some light lifting and some heavy lifting, provide ratings based on the higher requirement. In considering the most demanding aspect of each task, also take into account any factors, such as unusual posture, frequency, and duration of sustained work which might contribute to the overall demand level.

b. The level of demand placed on a single individual performing the task. Occasionally a given task will be performed by more than one person. In this case, assume that the workload is shared equally by all members performing (i.e., if a 300-lb object is generally lifted by 3 people, the task demand for a single individual would be 100 lbs).

c. The demands of a normal working day or shift. Do not base your ratings on the exceptional situation of wartime conditions or similar maximum performance exercises. However, if the task is seasonal work, report the activity as it is performed during a normal working shift that occurs during the most demanding season. Do not attempt to spread it over the year in any manner.

d. The level of demand required by the complete task from start to finish. For example, any preliminary activities that are an integral part of the task should be considered in rating the task.

To obtain the maximum response possible, it is requested that you provide your best estimates even though you may not be absolutely certain of the rating. Draw upon your total experience in this AFSC, not just your current job assignment.

Now, begin the background section on the next page. When that is complete, proceed to the task ratings in Sections 2 and 3. Thank you for your cooperation in this survey.

BACKGROUND INFORMATION

Date

Case Control Number (1-4)

PLEASE PRINT INFORMATION REQUESTED AND CHECK APPLICABLE BOXES

NAME (*PRINT: LAST, MI*) (5-22)

DATE OF BIRTH (23-28) — Year / Month / Day

SEX (29) — MALE / FEMALE

GRADE (30) — E1 AB; E2 AMN; E3 A1C; E4 SRA SGT; E5 SSGT; E6 TSGT; E7 MSGT; E8 SMSGT; E9 CMSGT

SOCIAL SECURITY ACCOUNT NUMBER (*SSAN*) (31-39)

TELEPHONE — AREA CODE / DUTY EXTENSION

HEIGHT — FT / IN (40-42)

WEIGHT — LBS (43-45)

PRIMARY AFSC (46-52) — PREFIX / NUMBER / SUFFIX

DUTY AFSC (53-59) — PREFIX / NUMBER / SUFFIX

MAJOR COMMAND (*CHECK ONE*) (60)

- A AAC
- G DMAAC
- C ADCOM
- E AFAFC
- Y AFCS
- O AFOSDC
- F AFLC
- M AFRES
- H AFSC
- I ARPC
- J ATC
- K AU
- N HQ USAF or FLO EXT
- Q MAC
- R PACAF
- S SAC
- T TAC
- B USAFA
- D USAFE
- U USAFSS
- X OTHER UNIT or ORGANIZATION

TOTAL MONTHS IN PRESENT JOB (Card 02: 5-7)

TOTAL MONTHS AT PRESENT BASE (Card 02: 8-10)

TOTAL MONTHS IN DUTY AFSC (Card 02: 11-13)

TOTAL MONTHS IN CAREER FIELD (Card 02: 14-16)

TOTAL MONTHS ACTIVE FEDERAL MILITARY SERVICE (Card 02: 17-19)

NUMBER OF SUBORDINATES WHO REPORT TO YOU DIRECTLY FOR SUPERVISION (Card 02: 20-21)

DURING THE PAST YEAR HAVE ANY OF YOUR SUBORDINATES EXPERIENCED DIFFICULTY PERFORMING IN THIS CAREER LADDER BECAUSE THE PHYSICAL DEMANDS OF THE JOB EXCEEDED THEIR PHYSICAL STRENGTH OR STAMINA CAPABILITIES? (Card 02: 22) — YES / NO

ORGANIZATION (Card 02: 24-73)

BASE OR INSTALLATION (Card 03: 5-8)

PRESENT WORK ASSIGNMENT (*POSITION OR JOB TITLE*) (Card 03: 9-72)

PRIVACY ACT STATEMENT

AUTHORITY: 5 USC Sec 301, AFR 35-2 & EO 9397. DISCLOSURE: COMPLETION OF THE INVENTORY, INCLUDING SSAN, IS MANDATORY. FAILURE TO PROVIDE COMPLETE INFORMATION WILL DETRACT FROM THE AIR FORCE'S CAPABILITY TO FULFILL THE FOLLOWING PURPOSES. PRINCIPAL PURPOSE: DEVELOPMENT OF SCREENING PROCEDURES AND CORRESPONDING JOB REQUIREMENTS FOR PHYSICAL STRENGTH AND STAMINA. ROUTINE USES: PERSONNEL AND OCCUPATIONAL RESEARCH, JOB REDESIGN AND DEVELOPMENT OF TRAINING PROGRAMS.

IMPORTANT INSTRUCTIONS
FOR SECTION 2

Do not continue until you read this page!

In this section, you will find listed on each page four tasks typically performed in your career ladder. First, read the task statement carefully. Then consider the most demanding aspects of that task and rate the strength requirement (write in the far left column) for each type of physical effort (lifting, carrying, etc.). A task may involve one, two, three, or four types of physical effort. Next, rate the endurance requirements in the far right column for the types of effort involved. As a frame of reference for endurance, assume that the task is performed at least once during a normal work shift. If it is typically performed more than once, use the most demanding conditions as the frame of reference. In either case, rate the extent of the endurance requirement for a normal work shift. Finally, add the name and ratings for any other strenuous type of effort not listed.

Here is an example illustrating how to make your ratings. You should supply a rating, ranging from 0 to 9, for each of the eight boxes associated with the four types of physical effort.

Strength Requirement Scale	INSTRUCTIONS	Endurance Requirement Scale
0 – no significant requirement 1 – extremely low 2 – very low 3 – low 4 – low to moderate 5 – moderate 6 – moderate to high 7 – high 8 – very high 9 – extremely high	Rate the task shown below on its requirement for both strength and endurance. Scale reference points for the strength requirement (scale at left) correspond to manipulating weight as follows: 0 = no significant requirement or manipulating 0–9 lbs; 5 = moderate requirement or manipulating 50–59 lbs; 9 = extremely high requirement or manipulating 90 lbs or more. Scale reference points for the endurance requirement (scale at right) are as follows: 0 = no significant requirement or brief duration/few repetitions per work shift; 5 = moderate requirement or moderate duration/some repetitions per shift; 9 = extremely high requirement or long duration/many repetitions per shift.	0 – no significant requirement 1 – extremely low 2 – very low 3 – low 4 – low to moderate 5 – moderate 6 – moderate to high 7 – high 8 – very high 9 – extremely high
TYPE OF EFFORT [5] Lifting/Lowering [0] Carrying [2] Pushing/Pulling [6] Torquing/Turning [ ] Other strenuous activity not listed above. SPECIFY: _____	Hypothetical task: Change flat tire on automobile	TYPE OF EFFORT [1] Lifting/Lowering [0] Carrying [0] Pushing/Pulling [1] Torquing/Turning [ ] Other strenuous activity not listed above. SPECIFY: _____

Proceed to Section 2 and supply all task ratings requested.

SECTION 2

Strength Requirement Scale	INSTRUCTIONS	Endurance Requirement Scale
0 – no significant requirement 1 – extremely low 2 – very low 3 – low 4 – low to moderate 5 – moderate 6 – moderate to high 7 – high 8 – very high 9 – extremely high	Rate each task below on its requirement for both strength and endurance. Scale reference points for the strength requirement (scale at left) correspond to manipulating weight as follows: 0 = no significant requirement or manipulating 0–9 lbs; 5 = moderate requirement or manipulating 50–59 lbs; 9 = extremely high requirement or manipulating 90 lbs or more. Scale reference points for the endurance requirement (scale at right) are as follows: 0 = no significant requirement or brief duration/few repetitions per work shift; 5 = moderate requirement or moderate duration/some repetitions per shift; 9 = extremely high requirement or long duration/many repetitions per shift. WRITE YOUR NUMERICAL RATING IN THE APPROPRIATE BOX.	0 – no significant requirement 1 – extremely low 2 – very low 3 – low 4 – low to moderate 5 – moderate 6 – moderate to high 7 – high 8 – very high 9 – extremely high
TYPE OF EFFORT [5] Lifting/Lowering [4] Carrying [4] Pushing/Pulling [2] Torquing/Turning [ ] Other strenuous activity not listed above. SPECIFY:	A2. Conduct inventories of supplies or equipment	TYPE OF EFFORT [2] Lifting/Lowering [2] Carrying [2] Pushing/Pulling [2] Torquing/Turning [ ] Other strenuous activity not listed above. SPECIFY:
[7] Lifting/Lowering [ ] Carrying [ ] Pushing/Pulling [7] Torquing/Turning [ ] Other strenuous activity not listed above. SPECIFY:	88. Direct aircraft crash fire operations	[0] Lifting/Lowering [4] Carrying [4] Pushing/Pulling [0] Torquing/Turning [ ] Other strenuous activity not listed above. SPECIFY:
[2] Lifting/Lowering [5] Carrying [5] Pushing/Pulling [7] Torquing/Turning [ ] Other strenuous activity not listed above. SPECIFY:	315. Direct hazardous materials firefighting operations	[0] Lifting/Lowering [4] Carrying [4] Pushing/Pulling [2] Torquing/Turning [ ] Other strenuous activity not listed above. SPECIFY:
[4] Lifting/Lowering [3] Carrying [3] Pushing/Pulling [4] Torquing/Turning [ ] Other strenuous activity not listed above. SPECIFY:	317. Direct rescue operations	[6] Lifting/Lowering [6] Carrying [6] Pushing/Pulling [6] Torquing/Turning [ ] Other strenuous activity not listed above. SPECIFY:

Have you supplied ratings for all boxes, left and right?

SECTION 2

Strength Requirement Scale	INSTRUCTIONS	Endurance Requirement Scale
0 – no significant requirement 1 – extremely low 2 – very low 3 – low 4 – low to moderate 5 – moderate 6 – moderate to high 7 – high 8 – very high 9 – extremely high	Rate each task below on its requirement for both strength and endurance. Scale reference points for the strength requirement (scale at left) correspond to manipulating weight as follows: 0 = no significant requirement or manipulating 0–9 lbs; 5 = moderate requirement or manipulating 50–59 lbs; 9 = extremely high requirement or manipulating 90 lbs or more. Scale reference points for the endurance requirement (scale at right) are as follows: 0 = no significant requirement or brief duration/few repetitions per work shift; 5 = moderate requirement or moderate duration/some repetitions per shift; 9 = extremely high requirement or long duration/many repetitions per shift. WRITE YOUR NUMERICAL RATING IN THE APPROPRIATE BOX.	0 – no significant requirement 1 – extremely low 2 – very low 3 – low 4 – low to moderate 5 – moderate 6 – moderate to high 7 – high 8 – very high 9 – extremely high

TYPE OF EFFORT		TYPE OF EFFORT
[4] Lifting/Lowering [3] Carrying [4] Pushing/Pulling [2] Torquing/Turning [ ] Other strenuous activity not listed above. SPECIFY:	04. Conduct "Broken Arrow" or disaster-type drills	[5] Lifting/Lowering [4] Carrying [5] Pushing/Pulling [2] Torquing/Turning [ ] Other strenuous activity not listed above. SPECIFY:
[7] Lifting/Lowering [4] Carrying [7] Pushing/Pulling [2] Torquing/Turning [ ] Other strenuous activity not listed above. SPECIFY:	08. Conduct egress training from aircraft or buildings	[5] Lifting/Lowering [3] Carrying [3] Pushing/Pulling [1] Torquing/Turning [ ] Other strenuous activity not listed above. SPECIFY:
[4] Lifting/Lowering [4] Carrying [5] Pushing/Pulling [3] Torquing/Turning [ ] Other strenuous activity not listed above. SPECIFY:	09. Conduct egress training from towers	[5] Lifting/Lowering [4] Carrying [3] Pushing/Pulling [2] Torquing/Turning [ ] Other strenuous activity not listed above. SPECIFY:
[3] Lifting/Lowering [3] Carrying [3] Pushing/Pulling [2] Torquing/Turning [ ] Other strenuous activity not listed above. SPECIFY:	011. Conduct first aid training	[0] Lifting/Lowering [2] Carrying [3] Pushing/Pulling [0] Torquing/Turning [ ] Other strenuous activity not listed above. SPECIFY:

Have you supplied ratings for all boxes, left and right?

IMPORTANT INSTRUCTIONS
FOR SECTION 3

DO NOT CONTINUE UNTIL YOU READ THIS PAGE!

The questions in this section are different from those you just answered in Section 2. In this section, you must think of specific types of demanding ACTIVITIES associated with some of the tasks you just rated.

Read carefully the instructions that follow and work through the example.

In this section you will find a subset of the most physically demanding tasks typically performed in your career ladder. Accompanying each task is a standard set of questions for you to answer. The questions relate to the four types of physical effort considered in Section 2, that is, lift/lower, push/pull, carry, and turn/torque. As you answer the questions in this section, keep in mind these important and especially relevant instructions.

a. If tools and/or equipment are involved in the activity, base your answers on the effort expended by the airman while using the tools/equipment. In other words, separate "man effort" from "machine effort."

b. If the task is also performed by others in your AFSC in a "specialty shop" (that is, a tire shop, engine depot, etc.), answer the questions in terms of whichever job is more physically demanding.

c. Because the questions in this section must apply to all AFSCs, they may not address yours perfectly. For that reason, we have provided a place for REMARKS at the end of the section so that you may supply any additional information you deem appropriate.

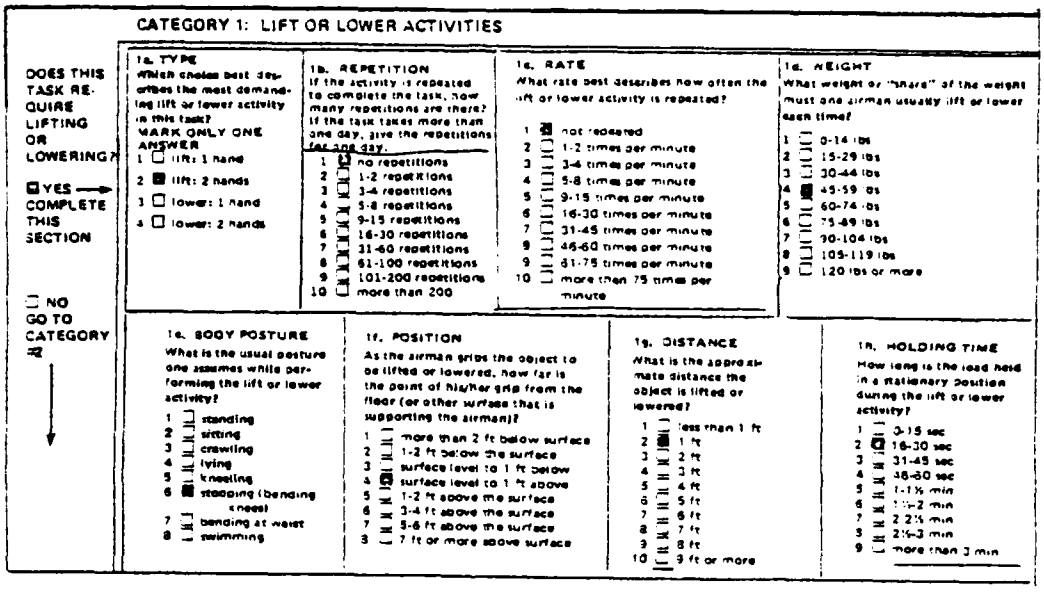
An example illustrating how to analyze a task and record your answers follows. First, you decide if the task requires lifting or lowering. If so, imagine all the possible lift/lower activities involved and then select the most demanding one to use in answering the questions related to lifting and lowering. If not, go on to the next category of physical effort, i.e., push/pull. Repeat this process until you have covered all four categories.

HYPOTHETICAL TASK: Change flat tire on automobile

Category 1. LIFT OR LOWER Activity. Think about the things you may lift or lower in changing a flat tire. Some are as follows:

- lifting the spare tire out of the trunk
- lowering the spare tire from the trunk to the ground
- lifting the spare tire onto the lug bolts
- lifting the flat tire into the trunk
- pumping the jack handle

The most physically demanding of these is judged to be lifting the spare tire onto the lug bolts since it involves a stooped posture and holding the tire while positioning it on the lug bolts. So the lift/lower category may be filled out as follows:



CATEGORY 1: LIFT OR LOWER ACTIVITIES

DOES THIS TASK REQUIRE LIFTING OR LOWERING?

☒ YES → COMPLETE THIS SECTION

☐ NO GO TO CATEGORY #2

1a. TYPE
Which choice best describes the most demanding lift or lower activity in this task?
MARK ONLY ONE ANSWER
1 ☐ lift: 1 hand
2 ☒ lift: 2 hands
3 ☐ lower: 1 hand
4 ☐ lower: 2 hands

1b. REPETITION
If the activity is repeated to complete the task, how many repetitions are there? If the task takes more than one day, give the repetitions for one day.
1 ☒ no repetitions
2 ☐ 1-2 repetitions
3 ☐ 3-4 repetitions
4 ☐ 5-8 repetitions
5 ☐ 9-15 repetitions
6 ☐ 16-30 repetitions
7 ☐ 31-60 repetitions
8 ☐ 61-100 repetitions
9 ☐ 101-200 repetitions
10 ☐ more than 200

1c. RATE
What rate best describes how often the lift or lower activity is repeated?
1 ☒ not repeated
2 ☐ 1-2 times per minute
3 ☐ 3-4 times per minute
4 ☐ 5-8 times per minute
5 ☐ 9-15 times per minute
6 ☐ 16-30 times per minute
7 ☐ 31-45 times per minute
8 ☐ 46-60 times per minute
9 ☐ 61-75 times per minute
10 ☐ more than 75 times per minute

1d. WEIGHT
What weight or "share" of the weight must one airman usually lift or lower each time?
1 ☐ 0-14 lbs
2 ☐ 15-29 lbs
3 ☐ 30-44 lbs
4 ☒ 45-59 lbs
5 ☐ 60-74 lbs
6 ☐ 75-89 lbs
7 ☐ 90-104 lbs
8 ☐ 105-119 lbs
9 ☐ 120 lbs or more

1e. BODY POSTURE
What is the usual posture one assumes while performing the lift or lower activity?
1 ☐ standing
2 ☐ sitting
3 ☐ crawling
4 ☐ lying
5 ☐ kneeling
6 ☒ stooping (bending knees)
7 ☐ bending at waist
8 ☐ swimming

1f. POSITION
As the airman grips the object to be lifted or lowered, how far is the point of his/her grip from the floor (or other surface that is supporting the airman)?
1 ☐ more than 2 ft below surface
2 ☐ 1-2 ft below the surface
3 ☐ surface level to 1 ft below
4 ☒ surface level to 1 ft above
5 ☐ 1-2 ft above the surface
6 ☐ 3-4 ft above the surface
7 ☐ 5-6 ft above the surface
8 ☐ 7 ft or more above surface

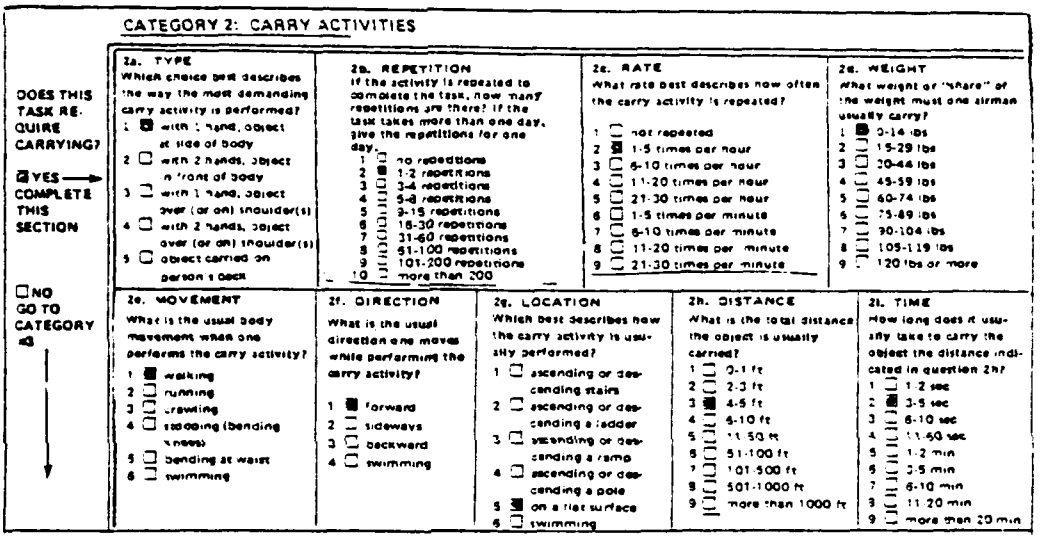
1g. DISTANCE
What is the approximate distance the object is lifted or lowered?
1 ☐ less than 1 ft
2 ☒ 1 ft
3 ☐ 2 ft
4 ☐ 3 ft
5 ☐ 4 ft
6 ☐ 5 ft
7 ☐ 6 ft
8 ☐ 7 ft
9 ☐ 8 ft
10 ☐ 9 ft or more

1h. HOLDING TIME
How long is the load held in a stationary position during the lift or lower activity?
1 ☐ 0-15 sec
2 ☒ 16-30 sec
3 ☐ 31-45 sec
4 ☐ 46-60 sec
5 ☐ 1-1½ min
6 ☐ 1½-2 min
7 ☐ 2-2½ min
8 ☐ 2½-3 min
9 ☐ more than 3 min

Note: Since the spare tire is lifted onto the lug bolts only once, the activity is not repeated, and the answer to question 1b is "1 ☒ no repetitions." Likewise, since the activity is not repeated, the answer to question 1c is "1 ☒ not repeated."

Category 2. CARRY

Carrying tools is judged to be the most demanding carry activity. Category 2 would be filled out as follows:



CATEGORY 2: CARRY ACTIVITIES

DOES THIS TASK REQUIRE CARRYING?

☑ YES → COMPLETE THIS SECTION

☐ NO → GO TO CATEGORY 3

2a. TYPE
Which choice best describes the way the most demanding carry activity is performed?
1 ■ with 1 hand, object at side of body
2 ☐ with 2 hands, object in front of body
3 ☐ with 1 hand, object over (or on) shoulder(s)
4 ☐ with 2 hands, object over (or on) shoulder(s)
5 ☐ object carried on person's back

2b. REPETITION
If the activity is repeated to complete the task, how many repetitions are there? If the task takes more than one day, give the repetitions for one day.
1 ☐ no repetitions
2 ■ 1-2 repetitions
3 ☐ 3-4 repetitions
4 ☐ 5-8 repetitions
5 ☐ 9-15 repetitions
6 ☐ 16-30 repetitions
7 ☐ 31-60 repetitions
8 ☐ 61-100 repetitions
9 ☐ 101-200 repetitions
10 ☐ more than 200

2c. RATE
What rate best describes how often the carry activity is repeated?
1 ☐ not repeated
2 ■ 1-5 times per hour
3 ☐ 6-10 times per hour
4 ☐ 11-20 times per hour
5 ☐ 21-30 times per hour
6 ☐ 1-5 times per minute
7 ☐ 6-10 times per minute
8 ☐ 11-20 times per minute
9 ☐ 21-30 times per minute

2d. WEIGHT
What weight or "share" of the weight must one airman usually carry?
1 ■ 0-14 lbs
2 ☐ 15-29 lbs
3 ☐ 30-44 lbs
4 ☐ 45-59 lbs
5 ☐ 60-74 lbs
6 ☐ 75-89 lbs
7 ☐ 90-104 lbs
8 ☐ 105-119 lbs
9 ☐ 120 lbs or more

2e. MOVEMENT
What is the usual body movement when one performs the carry activity?
1 ■ walking
2 ☐ running
3 ☐ crawling
4 ☐ stooping (bending knees)
5 ☐ bending at waist
6 ☐ swimming

2f. DIRECTION
What is the usual direction one moves while performing the carry activity?
1 ■ forward
2 ☐ sideways
3 ☐ backward
4 ☐ swimming

2g. LOCATION
Which best describes how the carry activity is usually performed?
1 ☐ ascending or descending stairs
2 ☐ ascending or descending a ladder
3 ☐ ascending or descending a ramp
4 ☐ ascending or descending a pole
5 ■ on a flat surface
6 ☐ swimming

2h. DISTANCE
What is the total distance the object is usually carried?
1 ☐ 0-1 ft
2 ☐ 2-3 ft
3 ■ 4-5 ft
4 ☐ 6-10 ft
5 ☐ 11-50 ft
6 ☐ 51-100 ft
7 ☐ 101-500 ft
8 ☐ 501-1000 ft
9 ☐ more than 1000 ft

2i. TIME
How long does it usually take to carry the object the distance indicated in question 2h?
1 ☐ 1-2 sec
2 ■ 3-5 sec
3 ☐ 6-10 sec
4 ☐ 11-60 sec
5 ☐ 1-2 min
6 ☐ 3-5 min
7 ☐ 6-10 min
8 ☐ 11-20 min
9 ☐ more than 20 min

Note: Since the tools arecarried from the trunk of the car to the tire and then back again, the carry activity is repeated, and the answer to question 2b is "2 ■ 1-2 repetitions." Likewise, since the activity is repeated, the answer to question 2c is "2 ■ 1-5 times per hour."

Category 3. PUSH OR PULL. Activities could include:

- pulling flat tire off lug bolts
- pushing (rolling) tire along surface
- pulling spare tire out of stored position

Pulling spare tire out of stored position is judged to be the most demanding activity. Category 3 would be filled out as follows:

CATEGORY 3: PUSH OR PULL ACTIVITIES

DOES THIS TASK REQUIRE PUSHING OR PULLING?

☒ YES → COMPLETE THIS SECTION

☐ NO → GO TO CATEGORY 4

3a. TYPE
Which choice best describes the most demanding push or pull activity in this task?
MARK ONLY ONE ANSWER

1 ☐ push: 1 hand
2 ☐ push: 2 hands
3 ☐ pull: 1 hand
4 ☒ pull: 2 hands
5 ☐ push with shoulder
6 ☐ push with back
7 ☐ push with foot/feet
8 ☐ push with hip

3b. REPETITION
If the activity is repeated to complete the task, how many repetitions are there? If the task takes more than one day, give the repetitions for one day.

1 ☐ no repetitions
2 ■ 1-2 repetitions
3 ☐ 3-4 repetitions
4 ☐ 5-8 repetitions
5 ☐ 9-15 repetitions
6 ☐ 16-30 repetitions
7 ☐ 31-60 repetitions
8 ☐ 61-100 repetitions
9 ☐ 101-200 repetitions
10 ☐ more than 200

3c. RATE
What rate best describes how often the push or pull activity is repeated?

1 ☐ not repeated
2 ■ 1-5 times per hour
3 ☐ 6-10 times per hour
4 ☐ 11-20 times per hour
5 ☐ 21-30 times per hour
6 ☐ 1-5 times per minute
7 ☐ 6-10 times per minute
8 ☐ 11-20 times per minute
9 ☐ 21-30 times per minute

3d. FORCE
What force must one airman usually apply to push or pull the object? (Not the weight of the object.)

1 ☐ 0-14 lbs
2 ■ 15-29 lbs
3 ☐ 30-44 lbs
4 ☐ 45-59 lbs
5 ☐ 60-74 lbs
6 ☐ 75-89 lbs
7 ☐ 90-104 lbs
8 ☐ 105-119 lbs
9 ☐ 120 lbs or more

3e. BODY POSTURE
What is the usual posture one assumes while performing the push or pull activity?

1 ☐ standing
2 ☐ sitting
3 ☐ crawling
4 ☐ lying
5 ☐ kneeling
6 ☐ stooping (bending knees)
7 ☒ bending at waist
8 ☐ walking
9 ☐ swimming

3f. POSITION
As the airman pushes or pulls the object, how far is the point at which his/her force is applied from the floor (or other surface that is supporting the airman)?

1 ☐ more than 2 ft below the surface
2 ☐ 1-2 ft below surface
3 ☐ surface level to 1 ft below
4 ☐ surface level to 1 ft above
5 ☐ 1-2 ft above the surface
6 ■ 3-4 ft above the surface
7 ☐ 5-6 ft above the surface
8 ☐ 7 ft or more above the surface

3g. DISTANCE
What is the approximate distance the object is pushed or pulled?

1 ☐ 0-1 ft
2 ■ 2-3 ft
3 ☐ 4-5 ft
4 ☐ 6-10 ft
5 ☐ 11-50 ft
6 ☐ 51-100 ft
7 ☐ 101-500 ft
8 ☐ 501-1000 ft
9 ☐ more than 1000 ft

3h. TIME
How long does it usually take to push or pull the object the distance indicated in question 3g?

1 ■ 1-2 sec
2 ☐ 3-5 sec
3 ☐ 6-10 sec
4 ☐ 11-60 sec
5 ☐ 1-2 min
6 ☐ 3-5 min
7 ☐ 6-10 min
8 ☐ 11-20 min
9 ☐ more than 20 min

Category 4. TORQUE OR TURN

Removing lug nuts is judged to be the most demanding torque/turn activity. Category 4 would be filled out as follows:

CATEGORY 4: TORQUE OR TURN ACTIVITIES

DOES THIS TASK REQUIRE TORQUING OR TURNING?

☒ YES → COMPLETE THIS SECTION

☐ NO

NOW GO TO GENERAL TASK INFORMATION

4a. TYPE
Which choice best describes the most demanding torque or turn activity in this task?
MARK ONLY ONE ANSWER
1 ☐ 1 hand on lever
2 ☒ 2 hands on lever
3 ☐ 1 hand on wheel or knob
4 ☐ 2 hands on wheel or knob
5 ☐ 1 hand on crank
6 ☐ 2 hands on crank
7 ☐ 1 hand on handle
8 ☐ 2 hands on handle

4b. REPETITION
If the activity is repeated to complete the task, how many repetitions are there? If the task takes more than one day, give the repetitions for one day.
1 ☐ no repetitions
2 ☐ 1-2 repetitions
3 ☐ 3-4 repetitions
4 ☒ 5-8 repetitions
5 ☐ 9-15 repetitions
6 ☐ 16-30 repetitions
7 ☐ 31-60 repetitions
8 ☐ 61-100 repetitions
9 ☐ 101-200 repetitions
10 ☐ more than 200

4c. RATE
What rate best describes how often the torque or turn activity is repeated?
1 ☐ not repeated
2 ☐ 1-2 times per minute
3 ☒ 3-4 times per minute
4 ☐ 5-8 times per minute
5 ☐ 9-15 times per minute
6 ☐ 16-30 times per minute
7 ☐ 31-45 times per minute
8 ☐ 46-60 times per minute
9 ☐ 61-75 times per minute
10 ☐ more than 75 times per minute

4d. FORCE
What force must one airman usually apply to do this torque or turn activity?
1 ☐ 0-9 lbs
2 ☐ 10-19 lbs
3 ☐ 20-29 lbs
4 ☐ 30-39 lbs
5 ☐ 40-49 lbs
6 ☐ 50-59 lbs
7 ☐ 60-69 lbs
8 ☐ 70-79 lbs
9 ☐ 80 lbs or more

4e. BODY POSTURE
What is the usual posture one assumes while performing the torque or turn activity?
1 ☐ standing
2 ☐ sitting
3 ☐ lying
4 ☐ kneeling
5 ☒ stooping (bending knees)
6 ☐ bending at waist
7 ☐ walking
8 ☐ swimming

4f. POSITION
As the airman grips the object to be torqued or turned, how far is the point of his/her grip from the floor?
1 ☐ more than 2 ft below the surface
2 ☐ 1-2 ft below the surface
3 ☐ surface level to 1 ft below
4 ☐ surface level to 1 ft above
5 ☐ 1-2 ft above the surface
6 ☐ 3-4 ft above the surface
7 ☐ 5-6 ft above the surface
8 ☐ 7 ft or more above the surface

4g. DISTANCE
What is the length of the radius of the object being turned?
1 ☐ 0-2 in
2 ☐ 3-5 in
3 ☐ 6-8 in
4 ☐ 9-12 in
5 ☐ 13-24 in
6 ☐ 25-36 in
7 ☐ 37-48 in
8 ☐ 49-60 in
9 ☐ more than 60 in

4h. REVOLUTIONS
How many revolutions does it take to complete the torque or turn activity?
1 ☐ 3-1/2 revolution
2 ☐ 1/2-1 revolution
3 ☐ 2-4 revolutions
4 ☐ 5-9 revolutions
5 ☐ 10-24 revolutions
6 ☐ 25-49 revolutions
7 ☐ 50-99 revolutions
8 ☐ 100-199 revolutions
9 ☒ 200 revolutions or more

4i. TIME
How long does it usually take to make the number of revolutions indicated in question 4h?
1 ☒ 1-2 sec
2 ☒ 3-5 sec
3 ☒ 6-10 sec
4 ☒ 11-20 sec
5 ☐ 21-40 sec
6 ☒ 41-60 sec
7 ☒ 1-2 min
8 ☒ 3-5 min
9 ☐ 6 min or more

Answer the following general questions for the task as a whole, considering all activities typically performed in accomplishing the task.

GENERAL TASK INFORMATION

ANSWER THESE QUESTIONS FOR THIS TASK

5a. TIME
What is the approximate time usually required to complete this entire TASK from start to finish?
1 ☒ 1/2 hr or less
2 ☐ 1 hr
3 ☐ 2 hr
4 ☐ 3 hr
5 ☐ 4 hr
6 ☐ 8 hr (one shift)
7 ☐ 2 shifts
8 ☐ 3 or more shifts

5b. PERCENT PERFORMING
Approximately what percent of the airmen in your AFSC perform this task?
01 %

5c PERCENT TIME
What percent of the airman's man-year is spent performing this task?
01 %

5d. ENVIRONMENT
What percent of the time is this task performed in each of the following environments? (Fill in all boxes.)
25 % indoors
75 % outdoors
00 % inflight
100 % TOTAL

5e. MANPOWER
How many airmen usually work together as a team to accomplish this task?
01 Airmen

5f. FREQUENCY
How often is this task usually performed? (Write in times per day, per week, OR per month.)
01 times per day
01 times per week
001 times per month

Please begin now to complete the task evaluations that follow. Thank you for your cooperation.

[illegible] NOT FURNISHED TO DTIC

SECTION 3

INSTRUCTIONS

Carefully read the task shown at right. Then, for each category of physical effort shown below (lift/lower, push/pull, carry, and torque/turn), select the single most demanding activity and answer the questions for that activity only. Do not change the activity while answering questions within a category. As a general rule, answer the questions for a normal working day or shift and not the exceptional situation, such as wartime. If tools/equipment are involved, answer in terms of effort expended by the airman in using same. Remember, these are just a few of the demanding tasks in your AFSC. BLACKEN THE APPROPRIATE BOX TO INDICATE YOUR ANSWER.

M20. Rescue personnel from motor vehicles

CATEGORY 1: LIFT OR LOWER ACTIVITIES

DOES THIS TASK REQUIRE LIFTING OR LOWERING?

☐ YES → COMPLETE THIS SECTION

☒ NO → GO TO CATEGORY #2

1a. TYPE
Which choice best describes the most demanding lift or lower activity in this task?
MARK ONLY ONE ANSWER
1 ☐ lift: 1 hand
2 ☐ lift: 2 hands
3 ☐ lower: 1 hand
4 ☐ lower: 2 hands

1b. REPETITION
If the activity is repeated to complete the task, how many repetitions are there? If the task takes more than one day, give the repetitions for one day.
1 ☐ no repetitions
2 ☐ 1-2 repetitions
3 ☐ 3-4 repetitions
4 ☐ 5-8 repetitions
5 ☐ 9-15 repetitions
6 ☐ 16-30 repetitions
7 ☐ 31-60 repetitions
8 ☐ 61-100 repetitions
9 ☐ 101-200 repetitions
10 ☐ more than 200

1c. RATE
What rate best describes how often the lift or lower activity is repeated?
1 ☐ not repeated
2 ☐ 1-2 times per minute
3 ☐ 3-4 times per minute
4 ☐ 5-8 times per minute
5 ☐ 9-15 times per minute
6 ☐ 16-30 times per minute
7 ☐ 31-45 times per minute
8 ☐ 46-60 times per minute
9 ☐ 61-75 times per minute
10 ☐ more than 75 times per minute

1d. WEIGHT
What weight or "share" of the weight must one airman usually lift or lower each time?
1 ☐ 0-14 lbs
2 ☐ 15-29 lbs
3 ☐ 30-44 lbs
4 ☐ 45-59 lbs
5 ☐ 60-74 lbs
6 ☐ 75-89 lbs
7 ☐ 90-104 lbs
8 ☐ 105-119 lbs
9 ☐ 120 lbs or more

1e. BODY POSTURE
What is the usual posture one assumes while performing the lift or lower activity?
1 ☐ standing
2 ☐ sitting
3 ☐ crawling
4 ☐ lying
5 ☐ kneeling
6 ☐ stooping (bending knees)
7 ☐ bending at waist
8 ☐ swimming

1f. POSITION
As the airman grips the object to be lifted or lowered, how far is the point of his/her grip from the floor (or other surface that is supporting the airman)?
1 ☐ more than 2 ft below surface
2 ☐ 1-2 ft below the surface
3 ☐ surface level to 1 ft below
4 ☐ surface level to 1 ft above
5 ☐ 1-2 ft above the surface
6 ☐ 3-4 ft above the surface
7 ☐ 5-6 ft above the surface
8 ☐ 7 ft or more above surface

1g. DISTANCE
What is the approximate distance the object is lifted or lowered?
1 ☐ less than 1 ft
2 ☐ 1 ft
3 ☐ 2 ft
4 ☐ 3 ft
5 ☐ 4 ft
6 ☐ 5 ft
7 ☐ 6 ft
8 ☐ 7 ft
9 ☐ 8 ft
10 ☐ 9 ft or more

1h. HOLDING TIME
How long is the load held in a stationary position during the lift or lower activity?
1 ☐ 0-15 sec
2 ☐ 16-30 sec
3 ☐ 31-45 sec
4 ☐ 46-60 sec
5 ☐ 1-1¼ min
6 ☐ 1¼-2 min
7 ☐ 2-2½ min
8 ☐ 2½-3 min
9 ☐ more than 3 min

CATEGORY 2: CARRY ACTIVITIES

DOES THIS TASK REQUIRE CARRYING?

☐ YES → COMPLETE THIS SECTION

☒ NO → GO TO CATEGORY #3

2a. TYPE
Which choice best describes the way the most demanding carry activity is performed?
1 ☐ with 1 hand, object at side of body
2 ☐ with 2 hands, object in front of body
3 ☐ with 1 hand, object over (or on) shoulder(s)
4 ☐ with 2 hands, object over (or on) shoulder(s)
5 ☐ object carried on person's back

2b. REPETITION
If the activity is repeated to complete the task, how many repetitions are there? If the task takes more than one day, give the repetitions for one day.
1 ☐ no repetitions
2 ☐ 1-2 repetitions
3 ☐ 3-4 repetitions
4 ☐ 5-8 repetitions
5 ☐ 9-15 repetitions
6 ☐ 16-30 repetitions
7 ☐ 31-60 repetitions
8 ☐ 61-100 repetitions
9 ☐ 101-200 repetitions
10 ☐ more than 200

2c. RATE
What rate best describes how often the carry activity is repeated?
1 ☐ not repeated
2 ☐ 1-5 times per hour
3 ☐ 6-10 times per hour
4 ☐ 11-20 times per hour
5 ☐ 21-30 times per hour
6 ☐ 1-5 times per minute
7 ☐ 6-10 times per minute
8 ☐ 11-20 times per minute
9 ☐ 21-30 times per minute

2d. WEIGHT
What weight or "share" of the weight must one airman usually carry?
1 ☐ 0-14 lbs
2 ☐ 15-29 lbs
3 ☐ 30-44 lbs
4 ☐ 45-59 lbs
5 ☐ 60-74 lbs
6 ☐ 75-89 lbs
7 ☐ 90-104 lbs
8 ☐ 105-119 lbs
9 ☐ 120 lbs or more

2e. MOVEMENT
What is the usual body movement when one performs the carry activity?
1 ☐ walking
2 ☐ running
3 ☐ crawling
4 ☐ stooping (bending knees)
5 ☐ bending at waist
6 ☐ swimming

2f. DIRECTION
What is the usual direction one moves while performing the carry activity?
1 ☐ forward
2 ☐ sideways
3 ☐ backward
4 ☐ swimming

2g. LOCATION
Which best describes how the carry activity is usually performed?
1 ☐ ascending or descending stairs
2 ☐ ascending or descending a ladder
3 ☐ ascending or descending a ramp
4 ☐ ascending or descending a pole
5 ☐ on a flat surface
6 ☐ swimming

2h. DISTANCE
What is the total distance the object is usually carried?
1 ☐ 0-1 ft
2 ☐ 2-3 ft
3 ☐ 4-5 ft
4 ☐ 6-10 ft
5 ☐ 11-50 ft
6 ☐ 51-100 ft
7 ☐ 101-500 ft
8 ☐ 501-1000 ft
9 ☐ more than 1000 ft

2i. TIME
How long does it usually take to carry the object the distance indicated in question 2h?
1 ☐ 1-2 sec
2 ☐ 3-5 sec
3 ☐ 6-10 sec
4 ☐ 11-60 sec
5 ☐ 1-2 min
6 ☐ 3-5 min
7 ☐ 6-10 min
8 ☐ 11-20 min
9 ☐ more than 20 min

CATEGORY 3: PUSH OR PULL ACTIVITIES

DOES THIS TASK REQUIRE PUSHING OR PULLING?

☐ YES → COMPLETE THIS SECTION

☐ NO → GO TO CATEGORY 4

3a. TYPE
Which choice best describes the most demanding push or pull activity in this task?
MARK ONLY ONE ANSWER
1 ☐ push: 1 hand
2 ☐ push: 2 hands
3 ☐ pull: 1 hand
4 ☐ pull: 2 hands
5 ☐ push with shoulder
6 ☐ push with back
7 ☐ push with foot/feet
8 ☐ push with hip

3b. REPETITION
If the activity is repeated to complete the task, how many repetitions are there? If the task takes more than one day, give the repetitions for one day.
1 ☐ no repetitions
2 ☐ 1-2 repetitions
3 ☐ 3-4 repetitions
4 ☐ 5-8 repetitions
5 ☐ 9-15 repetitions
6 ☐ 16-30 repetitions
7 ☐ 31-60 repetitions
8 ☐ 61-100 repetitions
9 ☐ 101-200 repetitions
10 ☐ more than 200

3c. RATE
What rate best describes how often the push or pull activity is repeated?
1 ☐ not repeated
2 ☐ 1-5 times per hour
3 ☐ 6-10 times per hour
4 ☐ 11-20 times per hour
5 ☐ 21-30 times per hour
6 ☐ 1-5 times per minute
7 ☐ 6-10 times per minute
8 ☐ 11-20 times per minute
9 ☐ 21-30 times per minute

3d. FORCE
What force must one airman usually apply to push or pull the object? (Not the weight of the object.)
1 ☐ 0-14 lbs
2 ☐ 15-29 lbs
3 ☐ 30-44 lbs
4 ☐ 45-59 lbs
5 ☐ 60-74 lbs
6 ☐ 75-89 lbs
7 ☐ 90-104 lbs
8 ☐ 105-119 lbs
9 ☐ 120 lbs or more

3e. BODY POSTURE
What is the usual posture one assumes while performing the push or pull activity?
1 ☐ standing
2 ☐ sitting
3 ☐ crawling
4 ☐ lying
5 ☐ kneeling
6 ☐ stooping (bending knees)
7 ☐ bending at waist
8 ☐ walking
9 ☐ swimming

3f. POSITION
As the airman pushes or pulls the object, how far is the point at which his/her force is applied from the floor (or other surface that is supporting the airman)?
1 ☐ more than 2 ft below the surface
2 ☐ 1-2 ft below surface
3 ☐ surface level to 1 ft below
4 ☐ surface level to 1 ft above
5 ☐ 1-2 ft above the surface
6 ☐ 3-4 ft above the surface
7 ☐ 5-6 ft above the surface
8 ☐ 7 ft or more above the surface

3g. DISTANCE
What is the approximate distance the object is pushed or pulled?
1 ☐ 0-1 ft
2 ☐ 2-3 ft
3 ☐ 4-5 ft
4 ☐ 6-10 ft
5 ☐ 11-50 ft
6 ☐ 51-100 ft
7 ☐ 101-500 ft
8 ☐ 501-1000 ft
9 ☐ more than 1000 ft

3h. TIME
How long does it usually take to push or pull the object the distance indicated in question 3g?
1 ☐ 1-2 sec
2 ☐ 3-5 sec
3 ☐ 6-10 sec
4 ☐ 11-60 sec
5 ☐ 1-2 min
6 ☐ 3-5 min
7 ☐ 6-10 min
8 ☐ 11-20 min
9 ☐ more than 20 min

CATEGORY 4: TORQUE OR TURN ACTIVITIES

DOES THIS TASK REQUIRE TORQUING OR TURNING?

☐ YES → COMPLETE THIS SECTION

☒ NO → NOW GO TO GENERAL TASK INFORMATION

4a. TYPE
Which choice best describes the most demanding torque or turn activity in this task?
MARK ONLY ONE ANSWER
1 ☐ 1 hand on lever
2 ☐ 2 hands on lever
3 ☐ 1 hand on wheel or knob
4 ☐ 2 hands on wheel or knob
5 ☐ 1 hand on crank
6 ☐ 2 hands on crank
7 ☐ 1 hand on handle
8 ☐ 2 hands on handle

4b. REPETITION
If the activity is repeated to complete the task, how many repetitions are there? If the task takes more than one day, give the repetitions for one day.
1 ☐ no repetitions
2 ☐ 1-2 repetitions
3 ☐ 3-4 repetitions
4 ☐ 5-8 repetitions
5 ☐ 9-15 repetitions
6 ☐ 16-30 repetitions
7 ☐ 31-60 repetitions
8 ☐ 61-100 repetitions
9 ☐ 101-200 repetitions
10 ☐ more than 200

4c. RATE
What rate best describes how often the torque or turn activity is repeated?
1 ☐ not repeated
2 ☐ 1-2 times per minute
3 ☐ 3-4 times per minute
4 ☐ 5-8 times per minute
5 ☐ 9-15 times per minute
6 ☐ 16-30 times per minute
7 ☐ 31-45 times per minute
8 ☐ 46-60 times per minute
9 ☐ 61-75 times per minute
10 ☐ more than 75 times per minute

4d. FORCE
What force must one airman usually apply to do this torque or turn activity?
1 ☐ 0-9 lbs
2 ☐ 10-19 lbs
3 ☐ 20-29 lbs
4 ☐ 30-39 lbs
5 ☐ 40-49 lbs
6 ☐ 50-59 lbs
7 ☐ 60-69 lbs
8 ☐ 70-79 lbs
9 ☐ 80 lbs or more

4e. BODY POSTURE
What is the usual posture one assumes while performing the torque or turn activity?
1 ☐ standing
2 ☐ sitting
3 ☐ lying
4 ☐ kneeling
5 ☐ stooping (bending knees)
6 ☐ bending at waist
7 ☐ walking
8 ☐ swimming

4f. POSITION
As the airman grips the object to be torqued or turned, how far is the point of his/her grip from the floor?
1 ☐ more than 2 ft below the surface
2 ☐ 1-2 ft below the surface
3 ☐ surface level to 1 ft below
4 ☐ surface level to 1 ft above
5 ☐ 1-2 ft above the surface
6 ☐ 3-4 ft above the surface
7 ☐ 5-6 ft above the surface
8 ☐ 7 ft or more above the surface

4g. DISTANCE
What is the length of the radius of the object being turned?
1 ☐ 0-2 in
2 ☐ 3-5 in
3 ☐ 6-8 in
4 ☐ 9-12 in
5 ☐ 13-24 in
6 ☐ 25-36 in
7 ☐ 37-48 in
8 ☐ 49-60 in
9 ☐ more than 60 in

4h. REVOLUTIONS
How many revolutions does it take to complete the torque or turn activity?
1 ☐ 0-1/2 revolution
2 ☐ 1/2-1 revolution
3 ☐ 2-4 revolutions
4 ☐ 5-9 revolutions
5 ☐ 10-24 revolutions
6 ☐ 25-49 revolutions
7 ☐ 50-99 revolutions
8 ☐ 100-199 revolutions
9 ☐ 200 revolutions or more

4i. TIME
How long does it usually take to make the number of revolutions indicated in question 4h?
1 ☐ 1-2 sec
2 ☐ 3-5 sec
3 ☐ 6-10 sec
4 ☐ 11-20 sec
5 ☐ 21-40 sec
6 ☐ 41-60 sec
7 ☐ 1-2 min
8 ☐ 3-5 min
9 ☐ 5 min or more

GENERAL TASK INFORMATION

ANSWER THESE QUESTIONS FOR THIS TASK

5a. TIME
What is the approximate time usually required to complete this entire TASK from start to finish?
1 ☐ 1/2 hr or less
2 ☐ 1 hr
3 ☐ 2 hr
4 ☐ 3 hr
5 ☐ 4 hr
6 ☐ 8 hr (one shift)
7 ☐ 2 shifts
8 ☐ 3 or more shifts

5b. PERCENT PERFORMING
Approximately what percent of the airmen in your AFSC perform this task?
[ ] [ ] %

5c. PERCENT TIME
What percent of the airman's man-year is spent performing this task?
[ ] [ ] %

5d. ENVIRONMENT
What percent of the time is this task performed in each of the following environments? (Fill in all boxes.)
[ ] % indoors
[ ] % outdoors
[ ] % in flight
100 % TOTAL

5e. MANPOWER
How many airmen usually work together as a team to accomplish this task?
[ ] airmen

5f. FREQUENCY
How often is this task usually performed? (Write in times per day, per week, OR per month.)
[ ] times per day
[ ] times per week
[ ] times per month

6a. What percentage of the heavy work in your AFSC is covered by the four categories of effort used in this survey, i.e., lift/lower, carry, push/pull, and turn/torque?

[1][0][0] %

6b. If there are other categories of heavy work effort (other than lift/lower, carry, push/pull, and turn/torque) in your AFSC, name them below:

(1) _____ (3) _____

(2) _____ (4) _____

REMARKS. If you have comments or additional information about the tasks you have just evaluated, provide them in the space below.

STOP

After you have completed all three sections of this survey (including write-ins where appropriate), please check to be sure that all tasks have been rated.

Return completed booklet to CBPO for transmittal to:

AFHRL/MPCS
Attn: Kentron International, Inc.
Brooks AFB TX 78235

APPENDIX B

SAMPLE OF FIELD DATA FOR AFSC 304X4,
Ground Radio Equipment and Repair

TASK RANKINGS BY SUPERVISOR
K009, AFSC 304X4, Ground Radio Equipment & Repair

Ranking	Supervisor #1 TSG Lee Carswell AFB, TX SAC	Supervisor #2 TSG More Ellsworth AFB, SC SAC	Supervisor #3 SSG Smith Scott AFB, IL MAC
1	H	F	K
2	M	X	E
3	P	U	C
4	L	R	J
5	V	I	S
6	T	J	A
7	R	O	B
8	S	S	D
9	O	V	G
10	X	T	I
11	F	A	L
12	I	G	O
13	G	N	R
14	C	L	V
15	U	E	X
16	A	H	H
17	E	Y	N
18	Y	W	T
19	W	P	U
20	N	M	P
21	J		Y
22			W
23			
24			
25			

Note: Supervisor's names are ficticious. Task titles corresponding to task letters are given on the next page. Blanks signify supervisor's response of "Not Applicable".

TASK SHEET	AFSC 304X4 Ground Radio Equipment and Repair	X-009
TASK	RANK	TASK DESCRIPTION
A		Remove or install power supply systems (F 193)
B		Remove or install permanent type antenna systems (F 191)
C		Remove or install multiple channel HF power amplifiers (F 167)
D		Remove or install consoles other than launch control consoles (F 139)
E		Remove or install single channel SSB power amplifiers (F 220)
F		Set up mobile communications vans for use (F 145)
G		Remove or install multiple channel HF transmitters (F 170)
H		REmove or install multiple channel or track recorder & reproducers (F 176)
I		Remove or install multiple channel UHF transmitters (F 181)
J		Remove or install multiple channel UHF power amplifiers (F 178)
K		Dig trenches (L 662)
L		Remove or install UHF transmitters (F 235)
M		Set up tents or 1948 shelters (L 672)
N		Remove or install multiple channel UHF receivers (F 180)
O		Remove or install UHF transceivers (F 234)
P		Lay electrical or communications cables (L 664)
Q		Set up bath, kitchen or sanitation facilities (L 669)
R		Remove or install multiple channel HF transceivers (F 169)
S		Remove or install UHF linear power amplifiers (F 222)
T		Remove or install multiple HF receivers (F 168)
U		Remove or install facsimile systems (F 158)
V		Remove or install multiple channel UHF exciters (F 177)
W		Deliver test equipment to material control or PMEL (E 113)
X		Remove or install mobile antenna systems (F 163)
Y		Remove or install single channel SSB transceivers (F 222)

INTERVIEW SHEET	LAST NAME: LEE	FIRST: George (S1)	MI: W.	Grade: TSG	Base: Carswell AFB, TX
Date Interviewed: 5/2/80	Den	Phone: 817 735-5620	Unit Title: 30474 Ground Radio Equip. & Repair	AFSC: 009	MAJCOM: SAC

Task	LIFT POWER	CARRY	PUSH PULL	OTHER	REMARKS	S	B
H	1A/9 200/4P ≥50		2D/9			✔	
M	1A/9	2/2,1		3B/1	See back page 2 for details.	✔	
P			1B/9		Also Worksheet for addl equip. data	✔	
L	1B/1	2/2				✔	
V	1B/1	2/2				✔	
T	1B/1 60	2/2 60			HF Receiver, multiple channel. Lower from rack (SK). Carry to/from rack	✔	
R	1B/1 (SK) 60	2/2 60			HF Transmitter " "	✔	
S	1B/1 (SK) 40	2/2 40			UHF Linear Power (LPA) amplifier	✔	
O	1A/9 (FK) 50	2/2 50			(same as above - S)	✔	
X	1A/9 (FK) 20	2/2 20		3A/1 20	Mast for AT 197 Mobile Antenna	✔	
F			1/9 200/4P ≥50		PP mobilizers on wheels (split trailer)	✔	
I	1B/1 (SK) 60	2/2 60			Multiple channel UHF transmitter off racks	✔	
G	1B/1 (SK) 60	2/2 60			Multiple channel HF Transmitter off racks	✔	
C	1B/1 (SK) 30	2/2 30			Multiple channel HF Power Amplifier	✔	
U						✔	
A	3A/1 (FK) 175/2P	2/2 175/2P		1H/1 175/2P	SB 270 Power Supply. up flights of stairs climb to 40' level in tower	✔	W B
E	1A/9 40	3/2 40			Fan. Single channel SSB Power Amp.	✔	
Y	1A/9 (FK) 25				6182 model Single Side Band Transmitter	✔	
W	1A/9 (FK) 40				323 Signal Generator [40] Audio Oscillator [10] bulky	✔	
N	1B/1 (SK) 50	2/2 50			from rack. Multiple channel UHF Receiver	✔	
J	1B/1 50	2/2 50			Multiple channel UHF Power Amplifier	✔	
		SAMPLE					
	(18)	(15)	3	3		21	1

SAMPLE

VERIFICATION DATA

TASK	ACTIVITY	WEIGHT OR FORCE	POS.	OBJECT [Lbs/1P =]	REMARKS	S	E
H	Lift (FK)	425/4p = 108	9	GSH 34 Recorder/Reproducer (20 channel) [200/4p = 50] reposition	Bulky, man handle it around work area and at installation.	✓	
	Push		9	[350/4p = 87½] push along the floor	Fortunately not frequent job but you will encounter it and similar equipment on the job.		
M	Lift (FK)	156/2p = 78	9	1948 shelter box of equipment (floor, ropes, gear, etc.) [400/6p = 66⅔ = 67]	Hold circles in position and install roof supports...	✓	
	Carry		2,1	6-Man Tent [200/2p = 100]	Tent with spikes and ropes folded in a bundle.	✓	
	Hold/Pos.		1				
P	Pull		9	498L Cable (100' length) [75/1p]	Pull out, by sections, from spool and pull along the ground (heaviest part of task) Sometimes inclimate weather and terrain.	✓	
L	Lower (SK)	30	1	UHF Transmitter, [30/1p] 2 sections	Remove from rack almost shoulder level and lower to waist level. Then carry away... also replace unit	✓	
	Carry		2				
V	Lower (SK)	43	1	Multiple channel UHF Exciter [60/1p] T-1108 model	(similar to above Task L)	✓	
	Carry		2				

General Comments:

⇨ See Andrews AFB for heavy special equipment for VIP operations and and Transmitter Site at Davidsonville (near Annapolis, Md).

- 5 yrs. experience in AFSC.
- Critical Tasks: All equipment units 30, 40, 50, and 60 pounds Lift + Carry activities (to/from racks)
- Females: can handle most of the tasks well... protect them sometimes... usually good technicians."
- Equipment frequently carried up + down stairs. Endurance primarily associated with upstairs climb to 40' level in tower (i.e. carry SB270 power supply 175/2p in Task A). Also 4 pcs carried up tower stairs and at site activities in winter/summer under rough conditions of weather and terrain.
- Validate at Big 6922, Radio Mtn Shop – 3PM today (Fri) Additional Tech Order equipment/suits will be available.

WORKSHEET K # 009 AFSC # 304X4

AFSC TITLE: GROUND RADIO EQUIPMENT & REPAIR SAMPLE

TASK	OBJECT	POSTURE	ACTIVITY	ACTUAL (WT. OR FORCE)	ESTIMATED (WT. OR FORCE) S1 T3G LEE Barnwell SAC	S2 T2G MORE Tillsworth SAC	S3 S6G SMITH Scott MAC	S4	S5	OTHERS
H	AN/GSH-34 Multiple Channel Tape Recorder	9	Lift (FK)	425/4P = 106	200/3P = 50	300/3P = 100	100/3P = 33			350/4P = 88
H	" " " (4P push along smooth floor)	9	Push		350/4P = 88					
H	AN/GSH-36 Tape Recorder	9 2	Lift (FK) Carry	44 1/2		40	35			50
H	TP-1510 Tape Player	9 2	Lift (FK) Carry	130/2P = 65		150/2P = 75	75/2P = 38			120/2P = 60
H	AN/GSH-35 Tape Recorder	9 2	Lift (FK) Carry	325/4P = 81		200/4P = 50	150/4P = 38			300/4P = 75
M	1948 Shelter Box of Equip. (floor, ropes, supports, etc.)	9 2/1	Lift (FK) Carry		400/6P = 67	300/3P = 100				
M	6-Man Tent, bundle (tent, spikes, ropes, etc.)	9 2/1	Lift (FK) Carry	156/2P = 78	200/2P = 100	180/2P = 90				
P	487L Cable (100' length)	9	Pull	86	75	90				
L	UHF Transmitter (2 sections)	1 1,2	Lower (KF) Carry	30	50	40				
V	T-1108 Multiple Channel UHF Exciter	1 1/2	Lower (KF) Carry	43	60	100	40			
W	200 CD Audio Oscillator	9	Lift (FK)	21	30	12	10			
W	323 Signal Generator	9	Lift (FK)	62	40	40	50			
Y	6182 Single Side Band Transceiver	9	Lift (FK)	29	25	30				
T	Multiple Channel HF Receiver	9/1 1/2	Lift (FK) Carry	66	60	65				
RE	FRC-153 Multiple Channel HF Transceiver	9/1 1/2	Lift (FK) Carry	30	60	70				
S	AM-6154 UHF Liniar Power Amplifier	1/9 1/2	Lower (KF) Carry	70	40	55	62/2P = 31			

TASK	OBJECT K009 AFSC 304X4	POSTURE	ACTIVITY	ACTUAL: (WT OR FORCE)	ESTIMATED (WT. OR FORCE) Page 2 S1 TSG LEE	S2 TSG MORE	S3 SSG SMITH	S4	S5	OTHERS
O	GRC-171 UHF TRAnsceiver	9/1 2	Lift (FK) Carry	50	50		60			
F	Mobile Communication Van, Split Trailer	9	Push		200/4P =50	200/4P =50				
X	Mast for AT 197, Mobile Antenna	9/1 2 9	Lift (FK) Carry Hold/Tie		20 20 20/4P =5	10 10				
I	Multiple Channel UHF Transmitter	9/1 2	Lift (FK) Carry	50	60	50	40			
G	Multiple Channel HF Transmitter	9/1 2	Lift (FK) Carry		60	50				
C	Multiple Channel HF Power Amplifier	9/1 2	Lift (FK) Carry		30	75	62/2P =31			
U	DL 19W (Fax) Weather Facsimile	9/1 2	Lift (FK) Carry	86/2P =43	86/2P =43	75/2P =38	40			
A	PP-6978/F Power Supply	9/1 2	Lift (FK) Carry	82			80			80
A	PP-6977/F Power Supply	9/1 2	Lift (FK) Carry	85			80			90
A	SB 270 Power Supply	9/1 2	Lift (FK) Carry		175/2P =88					
RE	Single Channel SSB 30L-1 with suitcase Power Amplifier	9/1 2	Lift (FK) Carry	50	40	40	50			
RE	Single Channel SSB 30S-1 Power Amplifier	9/1 2	Lift (FK) Carry	165/2P =83		150/2P =75	160/2P =80			
N	Multiple Channel UHF Receiver	9/1 2	Lift (FK) Carry		50	75	20			
J	Multiple Channel UHF Power Amplifier	9/1 2	Lift (FK) Carry	50	50	50	80			50
T	R-1395/FR Receiver	9/1 2	Lift (FK) Carry	70						65
O	RT-980/GRC-171 Multiple Channel UHF Transceiver	9/1 2	Lift (FK) Carry			70	70			65
H	TT-728/F Printer	9/1 2	Lift (FK) Carry	44		40				

TASK	OBJECT K009 AFSC 304X4	Persons	Activity	ACTUAL (WT OR FORCE)	ESTIMATED (WT OR FORCE) Page 3 S1 TSG LEE	S2 TSG MORE	S3 SSG SMITH	S4	S5	OTHERS
H	AN/GSH-35 Tape Recorder Upper Section	9 2	Lift (FK) Carry	75/2 =38		70/2P =35				
H	AN/GSH-35 Tape Recorder Lower Section	9 2	Lift (FK) Carry	75/2 =38		70/2P =35				
H	AN/GSH-33 Tape Recorder Rack	9 2	Lift (FK) Carry	175/2P =88		100/2P =50	150/4P =35			
H	AN/GSH-34 Multichannel Tape Recorder, Upper Section	9 2	Lift (FK) Carry	75/2P =38		100/2P =50				
H	AN/GSH-34 Multichannel Tape Recorder, Lower Section	9 2	Lift (FK) Carry	75/2P =38		100/2P =50				
H	AN/GSH 34 Multichannel Tape Recorder, Total unit	9 2	Lift (FK) Carry	150/2P =75		200/2P =100				
H	AN/GSH-46/47 Recorder/Reproducer (Replaces AN/GSH-35 in 1981)	9 2	Lift (FK) Carry							
L	AN/GRA-53 UHF, Multichannel RT Unit	9/1 2	Lift (FK) Carry	48		40				
L	AN/GRA-53 UHF Multichannel Amplifier	9/1 2	Lift (FK) Carry	215/2P =108		150/2P =75				
L	AN/GRA-53 UHF Multichannel Power Supply	9/1 2	Lift (FK) Carry	57		50				
P	Portable Public Address System Amplifier	9/1 2	Lift (FK) Carry	44		40	100/2P =50			
P	Portable Public Address System Speaker, with stand	9/1 2	Lift (FK) Carry	18		15	20			
B	CU-547 Antenna Coupler	9/1 2	Lift (FK) Carry	90/2P =45		80/2P =40	50			
H	Dictatron, Time Announcer	9/1 2	Lift (FK) Carry	51		15				
R	GRA-4 Antenna System HF Multichannel Mobile Ant. Kit - with Box	9/1	Lift (FK)	189/4P =48		195/4P =49				
R	GRA-4 Antenna System HF Multichannel Mobile Ant. Kit - without Box	9/1	Lift (FK)	169/4P =42		175/4P =44				
R E	312B-4 w/case Station Control, with case w/case	9/1 9/2	Lift (FK) Carry	9 19		10 20	10 20			

TASK	OBJECT K009 AFSC 304X4	POSTURE	ACTIVITY	ACTUAL (WT OR FORCE)	ESTIMATED (WT. OR FORCE) Page 4 S1 TSG LEE	S2 TSG MORE	S3 SSG SMITH	S4	S5	OTHERS
L	AN/GRT-21(VHF)/22(UHF) Main Unit, Exciter (Carry upstairs to Tower)	9/1 2/H	Lift (FK) Carry	43		30	40			
L	AN/GRT-21/22 VHF Transmitter (Carry upstairs to Tower)	9/1 2/H	Lift (FK) Carry	27		30	60			
L	AN/GRT-21/22 Total Unit (Carry upstairs to Tower)	9/1 2/H	Lift (FK) Carry	70/2P =35		60/2P =30	100/2P =50			
P	RF Cable 1" dia.	9	Pull				75			
T	KWM2 Transceiver	9/1 2	Lift (FK) Carry				25			
H	Speaker Horns	9/1 2	Lift (FK) Carry	80						50
	MD-667/FR Demodulator	9/1 2	Lift (FK) Carry	55						60
	CU-1565/FR Antenna Coupler	9/1 2	Lift (FK) Carry	45			50			40
	RT-723A/GR GRC 175 Radio Multichannel VHF	9/1 2	Lift (FK) Carry	71		70	65			70
	AN/GRR-24 Single Channel UHF Receiver	9/1 2	Lift (FK) Carry	22		20	20			
	AN/GRR-25 Single Channel VHF Receiver	9/1 2	Lift (FK) Carry	7		20	10			
	RT-980/GRC-175 Multichannel VHF (Carry upstairs to Tower)	9/1 2/H	Lift (FK) Carry	74		70	70			
	AM/usm. 339 Oscilloscope with case	9/1 2	Lift (FK) Carry	30		40	50			
	PMI Kit	9/1 2	Lift (FK) Carry	11		10	10			
	DC Power Supply. (Hewlett Packard	9/1 2	Lift (FK) Carry	55		70	20			
	Tool Box	9/1 2	Lift (FK) Carry	19		10	15			
	E20843, SSB HF Transmitter	1	Push				600/7P =86			
	" " " Total wt of various models		(Info)	S22-T264-012/14 -013			<WT=795> <WT=805>	-001/5/6 E10PU10	<WT 975> <165P5>	

APPENDIX C

FIELD VALIDATION SCHEDULE (COMPLETED)

VERIFICATION REVIEWS: INTERVIEWS BY AFSC

AFSC #	AFSC TITLE	NUMBER OF INTERVIEWS
811X0	Security Police	3
811X2	Law Enforcement	0
811X0A/811X2A	Security Police/Law Enforce (Dog Qualified)	6
111X0	Defensive Aerial Gunner	0
112X0	Inflight Refueling Operator	2
113X0	Flight Engineer	1
114X0	Aircraft Loadmaster	7
115X0	Pararescue/Recovery	1
272X0	Air Traffic Control Operator	1
304X4	Ground Radio Equipment Repair	3
316X0F	Missile System Analyst, Titan	1
316X0G	Missile System Analyst, Minuteman	7
316X1/316X2	Missile System Mtn/Missile Elect. Equip. Mtn.	6
321X0	Bomb-Navigation Systems	4
322X2	Avionic Sensor Systems	3
328X3	Electronic Warfare Systems	4
328X4	Avionic Inertial & Radar Nav. Systems	5
316X0	Outside Wire & Antenna Mtn & Repair	3
316X1	Cable Splicing & Mtn.	5
316X4	Telephone Equipment Installer/Repairman	5
423X2	Aircrew Egress Systems	4
431X0	Helicoptor Maintenance	3
431X1/431X2	Aircraft Maintenance	18
443X0	Missile Mechanic	8
472X0	Vehicle Maintenance	4
472X1	Vehicle Maintenance	3
472X2	Vehicle Maintenance	4
472X3	Vehicle Maintenance	4
445X0F	Missile Facilities, Titan	2
445X0G	Missile Facilities, Minuteman	4
542X1	Electrical Power Line	3
545X0	Refrigeration & Air Conditioning	4
547X0	Heating Systems	6
551X0	Pavements Maintenance	5
551X1	Construction Equipment	3
571X0	Carpentry	6
552X1	Masonry	5
572X0	Fire Protection	4
611X0	Supply Services	6
612X0	Meatcutter	0
631X0	Fuel Services	5
921X0	Survival	2
922X0	Aircrew Life Support	5
443X1	Missile Pneudraulics, Titan	2
445X1	Missile Liquid Propellant Systems	3
	Total Interviews	180

VERIFICATION REVIEW SCHEDULE

TRIP	DATES & TEAM	BASE & LOCATION	COMMAND	K	AFSC #	AFSC TITLE
	Feb 13-15	Feb 13-15	ATC	038	571X0	Fire Protection
1	Denardo	Reese AFB		034	551X0	Pavements Mtn
	Bethea	Hurlwood, Tx		023	431X1	Aircraft Mtn (T37/T38)
	Duran					
	Feb 19-20	Feb 19-20	AFLC	018	361X0	Outside Wire & Ant Mtn & Rpr
2	Denardo,Bethea	Wright-Pat. AFB		035	551X1	Construction Equipment
	Lambert,Lofberg	Dayton, Ohio				
	Mar 5	Mar 5	ATC	018	571X0	
3	Denardo	Reese AFB		035	551X1	Verification Only
	Bethea	Hurlwood, Tx		023	431X1	
	Mar 7	Mar 7	ATC	036	552X0	Carpentry Specialist
	Denardo	Reese AFB		032	545X0	Refrigeration & Air Cond.
4	Bethea	Hurlwood, Tx				
	Duran					
	Lambert					
	Mar 16-22	Mar 17-21	AFLC	015	32272	Avionic Sensor System
	Denardo	Wright-Pat. AFB		016	32873	Electonic Warfare System
	Bethea	Dayton, Ohio		023	43171	Aircraft Mtn
	Lambert			032	545X0	Refrigeration & Air Cond.
	Ayoub			027	474X2	Vehicle Mtn
5	Lofberg			034	551X0	Pavements Mtn
				031	542X1	Electrical Power Line
				036	552X0	Carpentry Specialist
				037	552X1	Masonry Specialist
				028	472X3	Vehicle Mtn
			AFSC	011	31670	Msl Elect Equip & Msl Sys
	Apr 1-3	Apr 2-3	TAC	023	431X1	Aircraft Mtn (F-111)
	Denardo	Cannon AFB		028	472X3	Vehicle Mtn
	Lambert	Clovis, N. M.		025	472X0	Veh Mtn (Base Mtn Rpr)
6				034	551X0	Pavements Mtn
				026	472X1	Vehicle Mtn
				035	55171	Construction Equipment
	May 12-15	May 13-15	SAC	12/13	316X2F	Missile Electronic Equip Mtn
	Denardo	Little Rock AFB	"	"	"	" " " "
	Bethea	Jacksonville, ARK	"	"	"	" " " "
	Marcy		"	"	"	" " " "
			"	"	"	" " " "
			"	024	443X0	Missile Mechanic, Titan
			"	"	"	" " "
			"	029	445X0	Missile Facilities (F)
7			"	"	"	" " "
			"	017	328X4	Avionic Inert & Radar Nav Sys
			"	036	552X0	Carpentry Specialist
			"	038	571X0	Fire Protection
			MAC	033	547X0	Heating Systems
			MAC	026	472X1	Vehicle Mtn (Special Purpose)
			MAC	028	47273	Vehicle Mtn
			SAC	XXX	443X1	Missile Pneudraulics Rpr

VERIFICATION REVIEW SCHEDULE (CONTINUED)

TRIP	DATES & TEAM	BASE & LOCATION	COMMAND	K	AFSC #	AFSC TITLE
	Jun 15-20	June 16-20	SAC	014	321X0	Bomb-Navigation System
	Denardo	Dyess AFB	"	"	"	" " "
	Bethea	Abilene, TX	MAC	006	114X0	Aircraft Loadmaster (c-130 H)
	Marcy		SAC	016	328X3	Electronic Warfare System
	Smith		"	"	"	" " "
			"	"	"	" " "
			MAC	017	328X4	Avionic Inert & Radar Nav Sys
			"	"	"	" " " " "
			SAC	001A	811X0A	Security Police (Dog Qual)
8			"	"	"	" " " "
			"	002A	811X2A	Law Enforcement (Dog Qual)
			AFCC	020	362X4	Telephone Equip Install/Rprmn
			SAC	031	542X1	Electrical Power Line
			"	037	552X1	Masonry Specialist
			"	025	472X0	Vehicle Mtn
			"	027	472X2	Vehicle Mtn
			"	023	431X2A	Aircraft Mtn (B-52D)
			"	"	"	" " "
			"	"	431X2E	" " (KC-135)
			"	"	431X2C	" " (C-130H)
			"	"	"	" " "
	Jun 29-	Jun 30-Jul 3	SAC	001	811X0	Security Police
	Jul 3	Carswell AFB		001A	811X0A	" "
		Ft. Worth, Tx		014	321X0	Bomb Navigation System
	Denardo			"	"	" " "
	Lambert			017	328X4	Avionic Inert & Radar Nav Sys
	Smith			023	431X2	Aircraft Mtn (B-52D)
				"	"	" " (KC-135)
9				031	542X1	Electrical Power Line
				033	547X0	Heating Systems
				038	571X0	Fire Protection
				009	304X4	Ground Radio Equip & Repair
				021	423X2	Aircrew Egress Sytems
				037	552X1	Masonry Specialist
	Jul 13-18	Jul 14-18	SAC	011	316X0	Msl Elec Eq (G/H)/Msl Sys Anal (G)
	Denardo	Ellsworth AFB		"	"	" " " " " " "
	Bethea	Rapid City, SD		"	"	" " " " " " "
	Alley			024	443X0	Missile Mech (Minuteman)
	Duran			"	"	" " "
				"	"	" " "
				034	551X0	Pavements Mtn
				037	552X1	Masonry Specialist
				019	361X4	Msl Sys Cable Splicing & Mtn
10				"	"	" " " " " "
				"	"	" " " " " "
				023	431X2	Aircraft Mtn (KC-135)
				"	"	" " (B-52D)
				030	445X0	Missile Facilities
				"	"	" "

VERIFICATION REVIEW SCHEDULE (CONTINUED)

TRIP	DATES & TEAM	BASE & LOCATION	COMMAND	K	AFSC #	AFSC TITLE
				021	423X2	Aircrew Egress Systems
				009	304X4	Gnd Radio Equip & Repair
			SAC	036	552X0	Carpentry Specialist
				"	"	" "
10				027	472X2	Vehicle Maintenance
Cont.				004	112X0	Inflight Refueling Operator
				"	"	" " "
				041	631X0	Fuel Services Spec/Tech
				"	"	" " "
	Jul 27	Jul-28-31	MAC	036	552X0	Security Police
	Aug 1	Scott AFB		02A	811X0	Law Enforcement (Dog Qual)
	Denardo	Belleville, Ill		"	"	" " "
	Bethea			005	113X0	Flight Engineer
	Lambert			006	114X0	Aircraft Loadmaster
	Duran			"	"	" "
				"	"	" "
				"	"	" "
				"	"	"
				"	"	"
				007	115X0	Pararescue/Recovery
				009	304X4	Ground Radio Equip Repair
				018	361X0	Outside Wire & Mtn & Repair
				019	361X1	Cable Mtn Splicing
				020	362X4	Telephone Equip Install/Rprm
				"	"	" " " "
11				023	431X2	Aircraft Mtn (C-9)
				"	"	" " (C-140)
				027	472X2	Vehicle Mtn
				032	545X0	Refrigeration & Air Cond.
				033	547X0	Heating Systems
				034	551X0	Pavement Maintenance
				035	551X1	Construction Equipment Oper
				036	552X0	Carpentry Specialist
				037	552X1	Masonry Specialist
				038	571X0	Fire Protection
				041	631X0	Fuel Services Specialist/Tech
				"	"	" " " "
			MAC	043	922X0	Aircrew Life Support Spec
				"	"	" " " "
	Aug 10-16	Aug 11-15	TAC	015	322X2	Avionic Sensor System
	Denardo	Nellis AFB		"	"	" " "
	Bethea	Las Vegas, Nev		021	423X2	Aircraft Egress System
	Smith			"	"	" " "
12	Duran			022	431X0	Helicoptor Mtn
				023	431X1	Aircraft Mtn
				"	"	" "
				"	"	" "
				"	"	" "
				026	472X1	Vehicle Mtn

VERIFICATION REVIEW SCHEDULE (CONTINUED)

TRIP	DATES & TEAM	BASE & LOCATION	COMMAND	K	AFSC #	AFSC TITLE
				028	472X3	Vehicle Mtn
				033	547X0	Heating Systems
				"	"	" "
				039	611X0	Supply Services
				"	"	" "
12				041	631X0	Fuel Services Spec/Tech
Cont.				042	921X0	Survival Specialist
				"	"	" "
				043	922X0	" "
				"	"	" "
				022	431X0	Helicopter Mtn
	Aug 17-23	Aug 18-22	SAC	008	262X0	Air Traffic Control
	Denardo	Vandenberg AFB	"	010	316X0	Missile System Analyst
	Bethea	Lampoc, CA	"	011	316X0	Missile Elect Equip
	Smith		"	"	"	" " "
	Lambert		"	"	"	" " "
			"	013	316X2F	Msl Elect Equip Mtn
			"	018	361X0	Outside Wire & Ant Mtn & Repair
			"	019	361X1	Cable Splicing & Mtn
			"	020	362X4	Telephone Equip Install/Rprm
			"	"	"	" " " "
			MAC	022	431X0	Helicoptor Mtn
			SAC	024	443X0	Missile Mechanic
				"	"	" "
13				"	"	" "
				025	472X0	Vehicle Mtn
				"	"	" "
				030	445X0G	Missile Facilities (Minuteman)
				"	"	" " "
				039	611X0	Supply Services
				"	"	" "
				"	"	" "
				"	"	" "
				043	922X0	Aircrew Life Support Specialist
				XXX	443X1	Missile Pneudraulics (Titan)
				ZZZ	445X1	Msl Liquid Propellant Systems
				"	"	" " " "
				"	"	" " " "

Total Interviews = 180

APPENDIX D

VERIFICATION REVIEW SCHEDULE (FOLLOW-ON)

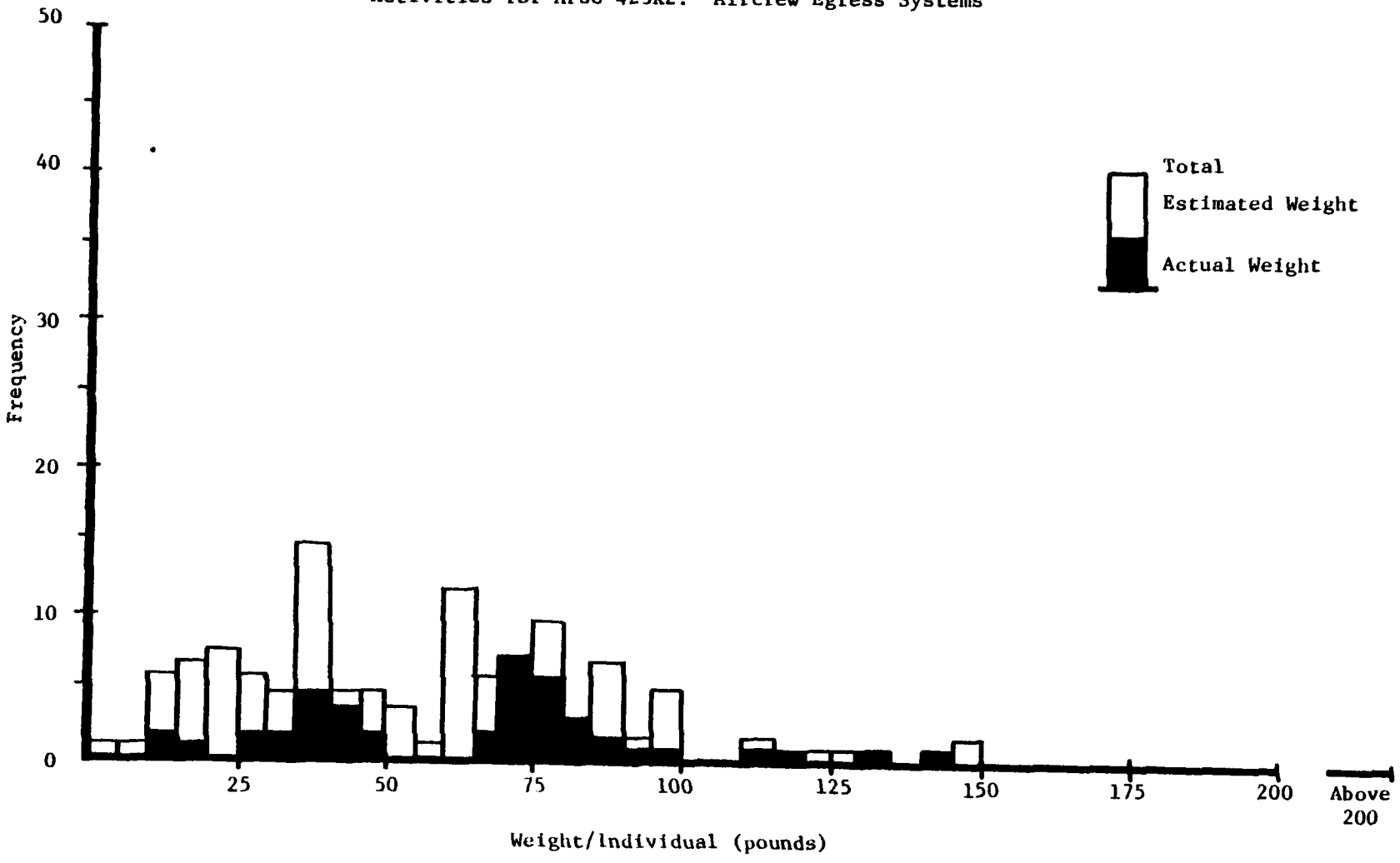
VERIFICATION REVIEW SCHEDULE (FOLLOW-ON)

TRIP	BASE & LOCATION	COMMAND	K	AFSC #	AFSC TITLE
		ATC	031	542X1	Electrical Power Line
	Shephard AFB		"	"	" " "
14	Wichita Falls, Tx		"	"	" " "
			022	811X2	Law Enforcement
			"	"	" "
			040	612X0	Meatcutter
		MAC	007	115X0	Pararescue/Recovery
	Kirtland AFB		"	"	" "
			"	"	" "
			022	431X0	Helicoptor Mtn
15			"	"	" "
			006	114X0	A/C Loadmaster (HC-130)
			002	811X2	Law Enforcement
			040	612X0	Meatcutter
		MAC	005	113X0	Flight Engineer (C-141)
	Travis AFB		"	"	" " (C-5)
	Fairfield, CA	SAC	"	"	" " (KC-135)
16	(50 mi NE San	"	004	112X0	Inflight Refueling Operator
	Francisco	MAC	006	114X0	A/C Loadmaster (C-141)
		"	"	"	" " (C-5)
		"	"	"	" " (KC-135)
		SAC	042	921X0	Survival Specialist
	Fairchild, AFB		"	"	" "
	Spokane, Wash		"	"	" "
			003	111X0	Defensive Aerial Gunner
			"	"	" " "
17			"	"	" " "
			004	112X0	Inflight Refueling Operator
			"	"	" " "
			005	113X0	Flight Engineer (B-52)
			"	"	" " (KC-135)
			022	431X0	Helicopter Mtn
		ATC	040	612X0	Meatcutter
	Reese AFB		002	811X2	Law Enforcement
18	Hurlwood, Tx		022	431X0	Helicoptor Mtn
			031	542X1	Electrical Power Line
			023	431X1	Aircraft Mtn
			038	571X0	Fire Protection

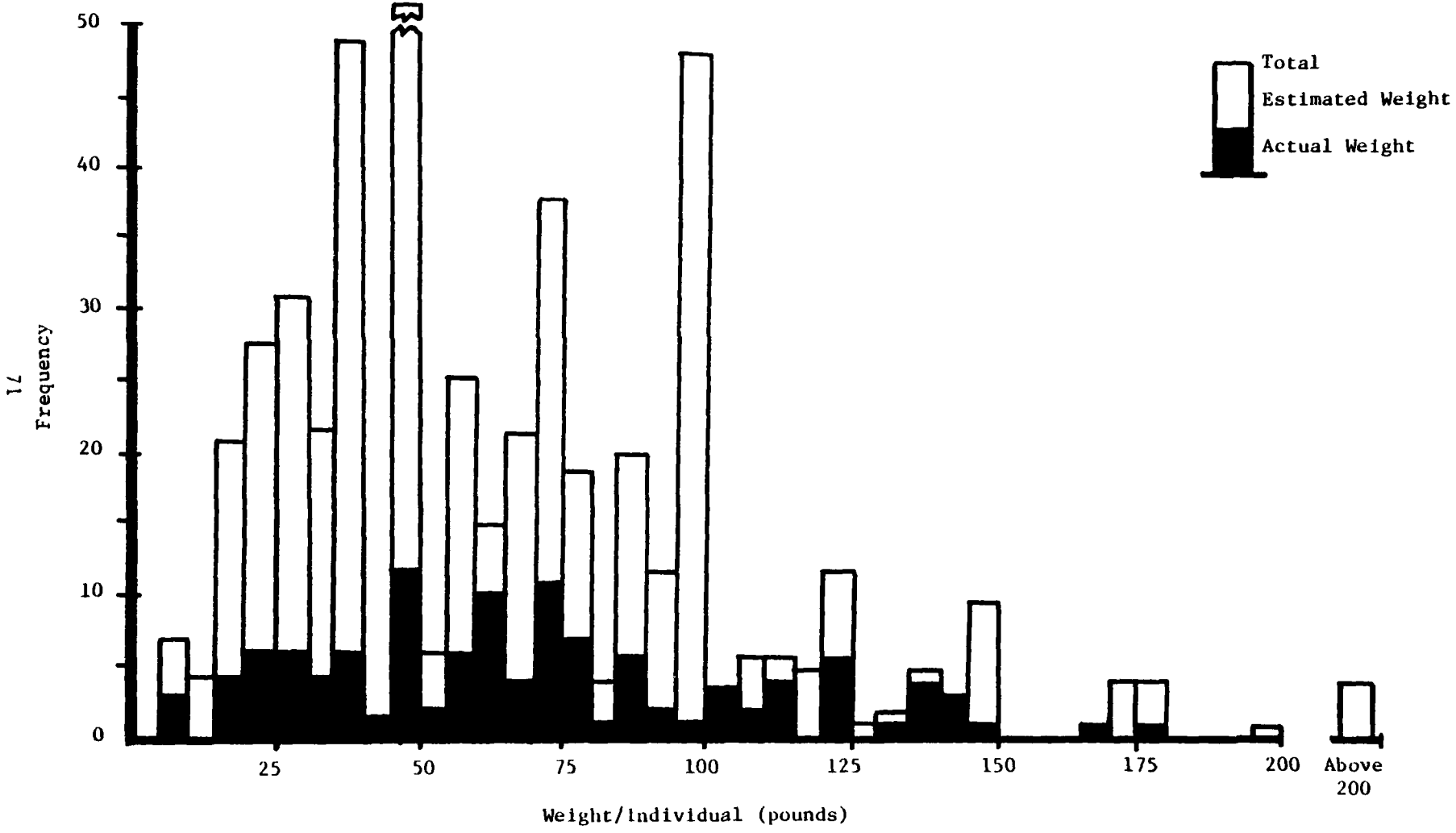
APPENDIX E

EXAMPLES OF FREQUENCY DISTRIBUTION OF WEIGHTS FOR LIFTING ACTIVITIES IN INDIVIDUAL AFSCs

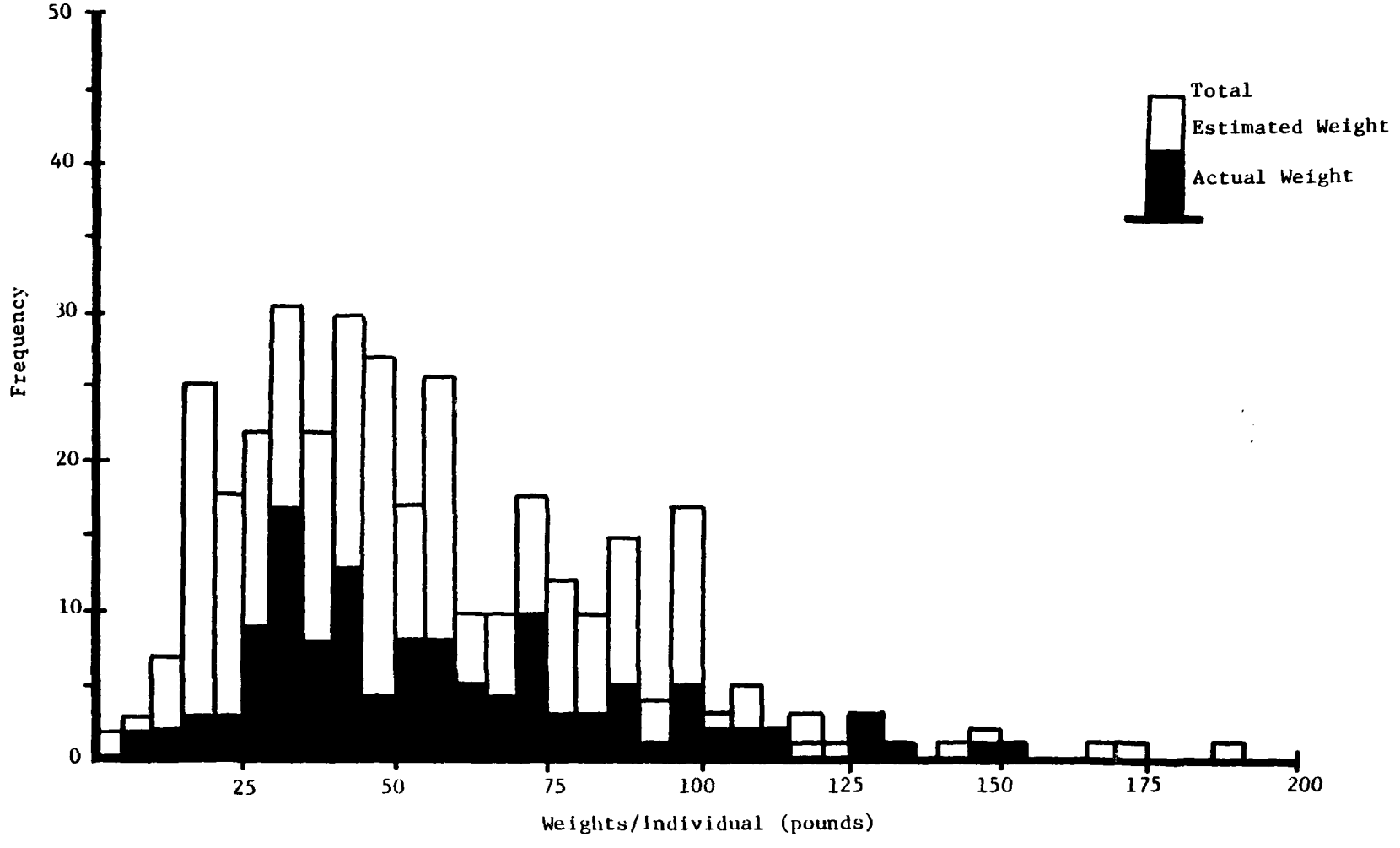
Frequency Distribution of Weights for Lift/Lower Activities for AFSC 423X2: Aircrew Egress Systems



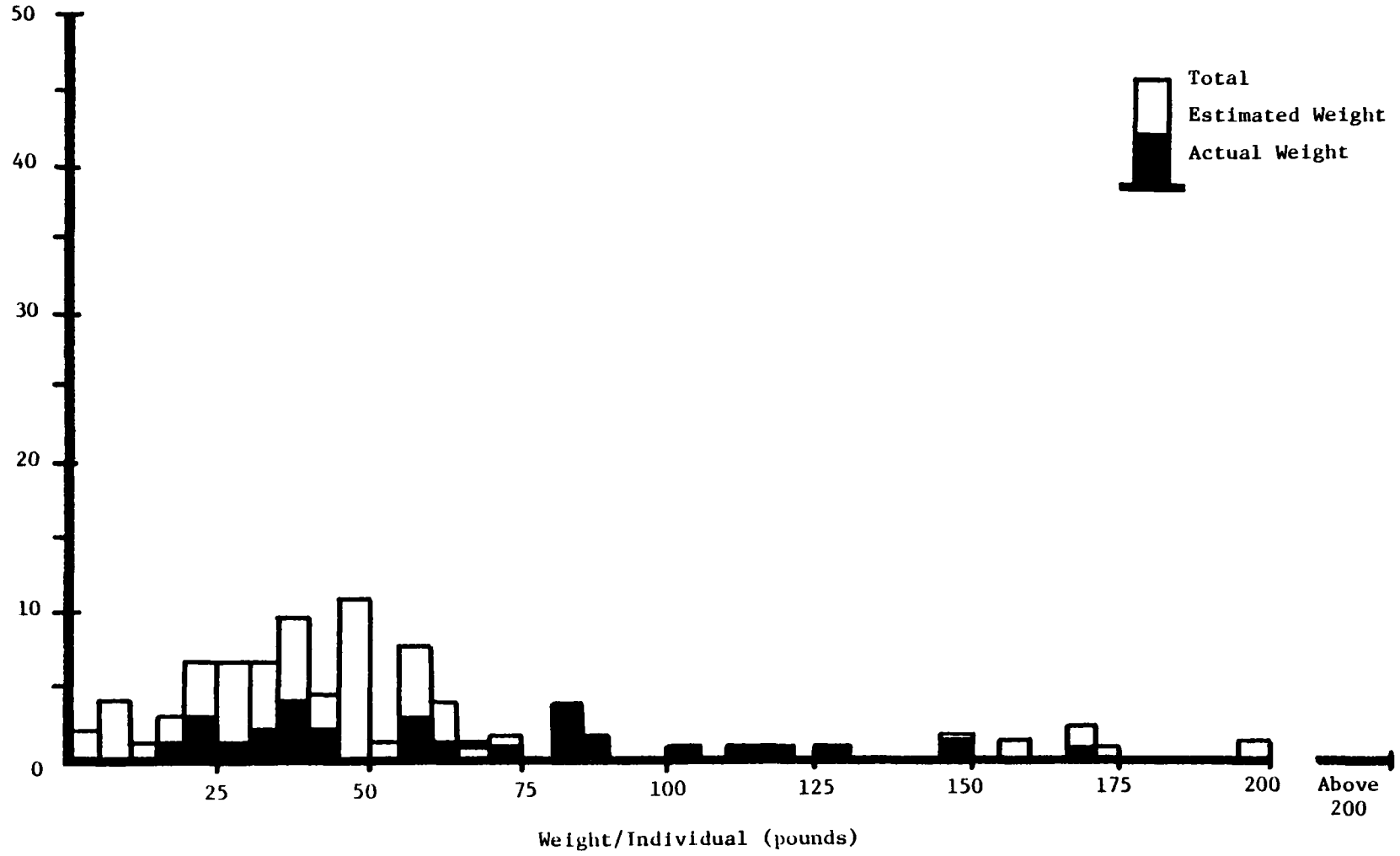
Frequency Distribution of Weights for Lift/Lower Activities
for AFSC 431X1 and 431X2: Aircraft MTN



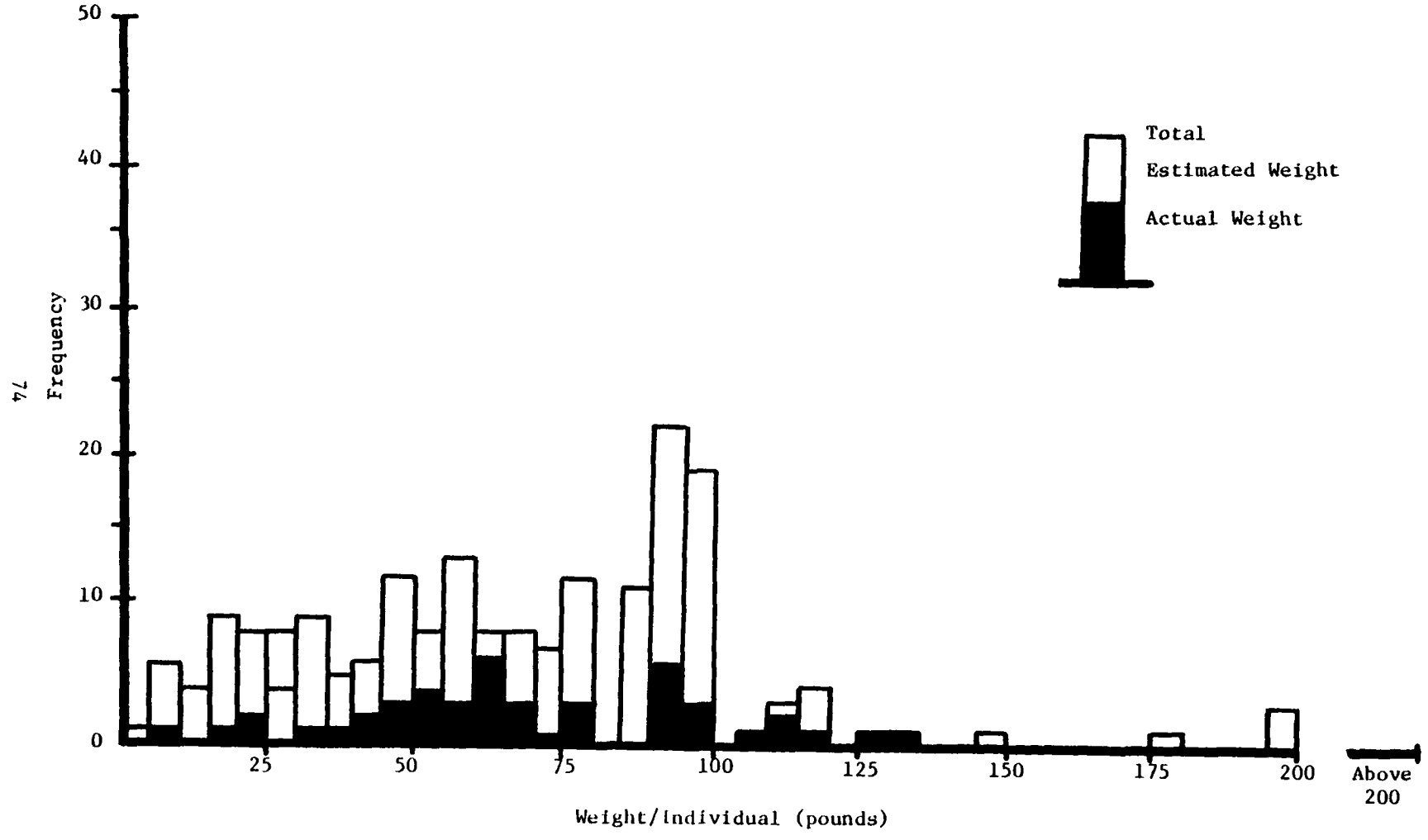
Frequency Distribution of Weights for Lift/Lower Activities for AFSC 443X0: Missile Mechanic



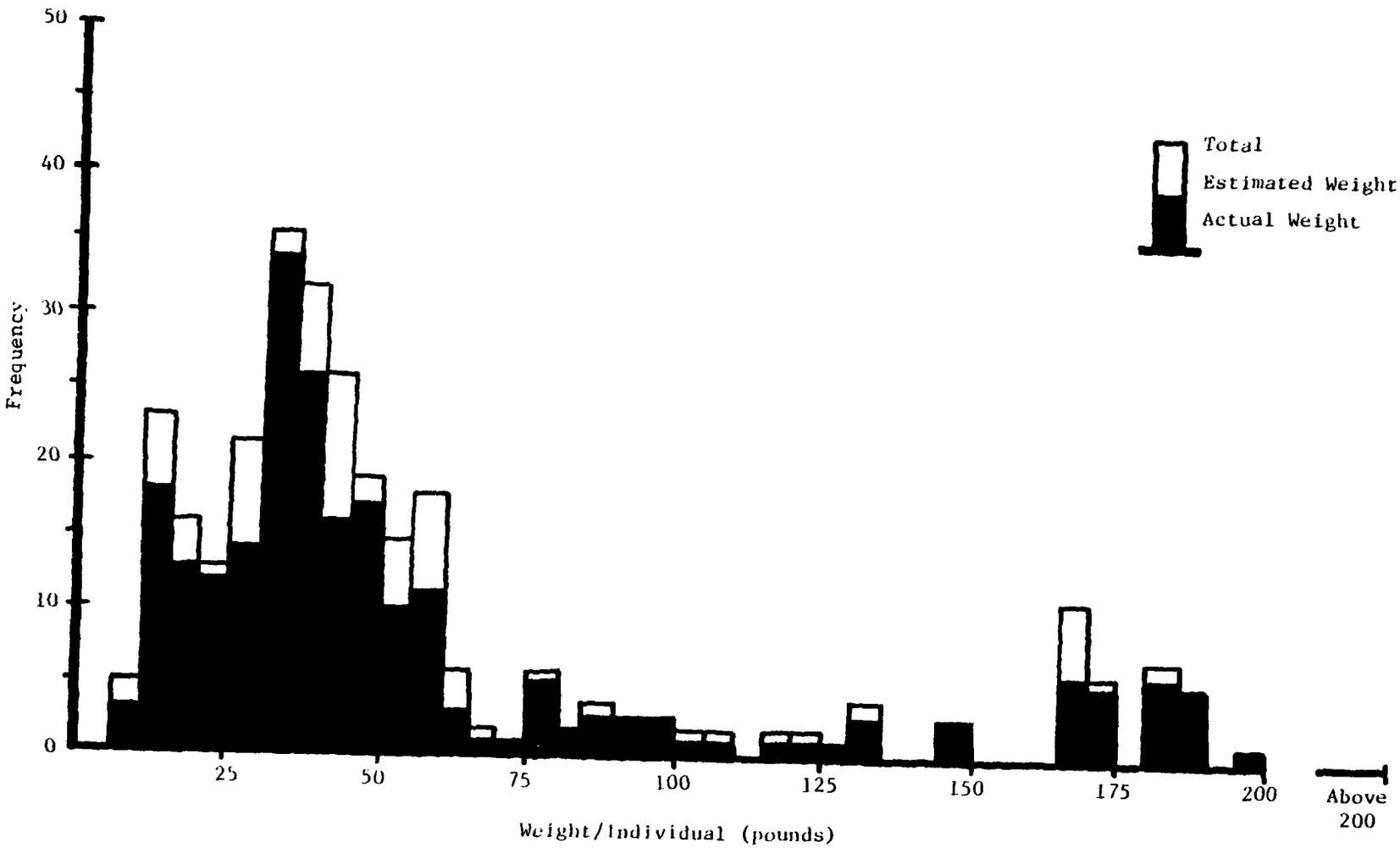
Frequency Distribution for Lift/Lower Activities for
AFSC 443X1: Missile Pneudralics, Titan

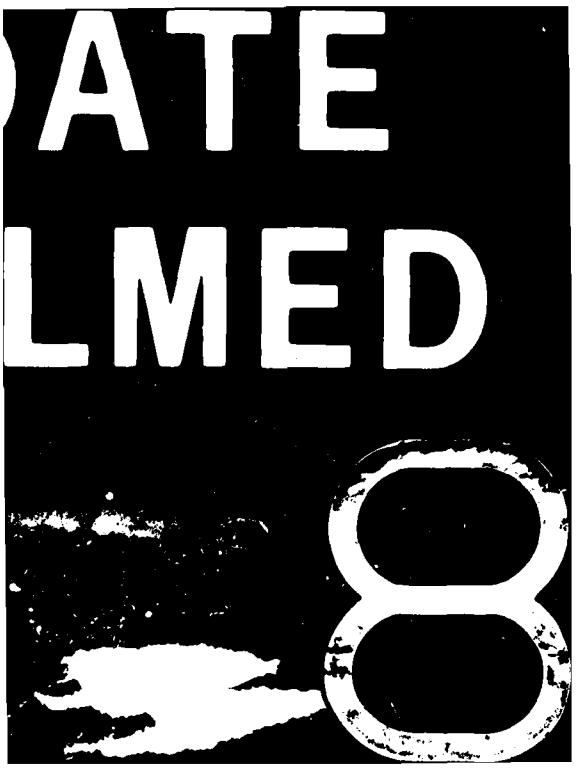


Frequency Distribution of Weights for Lift/Lower Activities
for AFSC 552X1: Masonry



Frequency Distribution of Weights for Lift/Lower Activities for AFSC 571X0: Fire Protection

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